E. Eng.

AIR FORCE

THE OFFICIAL SERVICE JOURNAL OF THE U. S. ARMY AIR FORCES

DECEMBER 1943

Vol. 26 No. 12

DECEMBER 1943

Contents

Procedure for AAF Personnel Returned from Overseas 5
Mission to Regensburg—A Co-pilot's Observations 9
What Navigators Should Know about the Astro-dome 12
Developments in Firepower—A Progress Report 14
Our B-26s Win Their Wings over Western Europe 19
Operations of Our Air Evacuation Service Around the World 21
Ground Crews Prove Their Ingenuity on the Combat Line 26
Shipping Fighter Planes Overseas —A Story in Pictures 28
Suggested Procedures for Surviving Emergency Sea Landings 30
Life with the First Control Tower Operators on Guadalcanal 37
How Cockpit Dials Are Illuminated with 'Black Light' 42
Development of Air Filters—Performance Characteristics 48
The Motors of the Enemy We're Fighting 54

DEPARTMENTS

Cross Country ... 1
Inspection ... 24
Roll of Honor ... 34
On the Line ... 40
Training Aids ... 44
Technique ... 48
Air Force Quiz ... 53

AIR FORCE

THE OFFICIAL SERVICE JOURNAL OF THE U. S. ARMY AIR FORCES

December Brief

WHAT WILL HAPPEN to you when you are ordered back to the States from a theatre of operations? If you are not physically fit for further combat, will there be a non-combat assignment for you? Will you have the opportunity to see your family? How will you be reassigned?

The answers to these and many other similar questions are to be found in the article on Page 5 which describes the establishment of a redistribution program by the Army Air Forces. The program is a result of months of study by Headquarters personnel officers. The detailed flow chart which accompanies the article portrays each step in the reassignment process, from the time an officer or enlisted man is ordered to return from his overseas station until reassigned in this country.

ONE OF THE greatest aerial battles in history was fought during the mass bombing raid on Regensburg August 17. A vivid account of the mission appears on Page 9 in the form of an official report written by Lieut. Col. Beirne Lay, Jr., a co-pilot on the raid. Colonel Lay, who served at AAF Headquarters prior to his assignment with the 8th Air Force, is the author of the book, "I Wanted Wings," based on his experiences as an aviation cadet. Colonel Lay has returned to the States for transition training in B-24s.

THE GRAPHIC STORY of the old Henderson Field control tower and its operators, which appears on Page 37, was prepared on Guadalcanal in answer to a request by higher authority in the Army Airways Communications System for a history of tower operations at the base. "Henderson Tower" is no dry history; it is a vivid, fast-moving sample of life in the tower during those hectic early days. Co-authors of the article are Capt. J. E. Roberts, a security officer and former newspaperman, and Staff Sgt. John R. Dunn, a former advertising copywriter, who has since returned to the States to enter Officer Candidate School.

THE DISPLAY of ingenuity on the part of ground crews, both at home and overseas, has been one of the most important factors in the present air war. In their ability to make something out of nothing when a situation demands it, our ground personnel —officers and men—have been without parallel. AIR FORCE this month begins a new feature on these men, based on maintenance reports received from combat theatres by the Air Service Command. Read "On the Combat Line," Page 26.

THE AIR FORCE Roll of Honor feature has been redesigned this month to permit the inclusion of more names and to afford easier readability and identification. The number of AAF officers and men receiving decorations has increased considerably during the past few months, resulting in the accumulation of a backlog of names. Until this surplus is exhausted, AIR FORCE will devote additional space to the feature. Three pages of names appear in this issue, beginning on Page 34.

A NEED for a better understanding of the proper use of the navigator's astro-dome is expressed in the article on Page 12 by Col. Thomas L. Thurlow, chief of the instrument and navigation unit of the Materiel Command equipment laboratory. Colonel Thurlow tells how the dome can be employed to best advantage by navigators.

FROM THE STANDPOINT of the armorer, we are designing guns and putting wings on them. A progress report on our developments in firepower by Col. Frank C. Wolfe, chief of the armament laboratory at Wright Field, appears on Page 14.

The Front Cover

There is no greater bond in this war than that between a fighter pilot and his crew chief. The pilot has the wings, but his crew chief sweats out every minute his plane is in the air, seems to care more than the pilot himself whether his plane and his pilot come home intact. This month's cover picture, taken by Tech. Sgt. Roger Coster, staff photographer, portrays this spirit. It is a scene that is re-enacted thousands of times a day around the world, wherever the men of the Army Air Forces are fighting.

AIR FORCE (formerly the Air Forces News Letter) is printed monthly by authority of Army Air Forces Regulation No. 5-6, Sept. 6, 1942, and with the approval of the Bureau of the Budget, Executive Office of the President. AIR FORCE is published by the U. S. Army Air Forces at the AIR FORCE Editorial Office, 101 Park Avenue, New York 17, N. Y., U.S.A., for use of personnel of the Army Air Forces and allied activities, and is not to be republished in whole or in part without express permission. Direct communication with this office has been authorized on matters of editorial content, circulation and distribution. Tel., MUrray Hill 5-1951; Teletype No. NY 1-2530; Director, Lieut. Col. James H. Straubel, A.C.

Air Force is primarily a medium for the exchange of ideas and information among Army Air Forces personnel. Opinions expressed by individual contributors do not necessarily express the official attitude of the Army Air Forces or the War Department.

CROSS COUNTRY

IMPORTANT revisions are being made in the Army Air Forces training program with the following principal objectives:

(1) To coordinate training activities.
(2) To provide standardization and continuity of instruction.
(3) To bridge existing gaps.
(4) To insure maximum use of equipment and manpower.
(5) To correct shortcomings indicated by operational experience.

On September 20 at Colorado Springs, 260 officers engaged in various phases of AAF training met to re-examine the program, convening by committees for studies of specific problems. Brig. Gen. Robert W. Harper, Assistant Chief of Air Staff, Training, returned to Washington with a stack of committee reports and recommendations.

In cooperation with the Training Command, the training air forces, and other agencies involved, moves are under way to effect many of the Colorado Springs proposals.

Most important of the changes are those affecting flexible gunnery instruction. Revisions in gunnery training are being made in all the air forces and commands. Flexible gunnery instruction is being started in the 1st and 4th Air Forces, which now are undertaking bombardment training as well as fighter training.

To make sure that flexible gunnery training progresses smoothly from one phase and one agency to another, schedules and curricula of the Training Command and the training air forces will be closely coordinated. By more effective liaison, the training schedule of the air forces will be made to pick up exactly at the point where that of the Training Command leaves off. By continued instruction and practice in the air forces, a maximum of gunnery training will be provided. Gunnery instruction has been handicapped in the past by lack of towing airplanes.

Further to standardize gunnery teaching, a manual is being prepared for use in all schools. It will become the bible of gunnery instructors. The Central Flexible Gunnery Instructors School will furnish gunnery instructors to the training air forces as well as to the Training Command.

As rapidly as practicable gunnery officers will be provided for squadrons, groups and wings to supervise training, to assist gunners and to see that equipment is kept in good condition.

A significant development in gunnery training is the use of the AT-23 airplane, a B-26 stripped down for target towing. Because of its exceptional maneuverability, it is admirably suited to this purpose. Tests have shown that at 22,000 feet the AT-23 can make 25 runs on a B-17 in 45 minutes. The calibrated airspeed of the AT-23 while towing targets at this altitude is 190 to 200 miles per hour.

Revisions also are in progress in the training of navigators and bombardiers.

The bombardier course is being increased from twelve weeks to eighteen weeks to allow a six-week instruction period in dead reckoning navigation. By May, 1944, every man who graduates as a bombardier will be proficient in dead reckoning navigation. This should not be confused with the existing 27-week course for students who graduate as precision bombardier-navigators.

As further evidence of current emphasis on broader training, an effort is being made to process all group commanders—present and future—through a modified course of navigation, bombardment and gunnery training. This will be done as the manpower and tactical situations permit. As an experiment, a two-weeks' course for group commanders has been conducted at El Paso, Texas.

Increased realism is being sought in tactical training. Combined fighter-bomber training in each of the domestic air forces is the principal step to be taken towards that objective. Having both fighters and bombers available will permit practice operations under conditions closely simulating those found in actual combat. Heretofore for training purposes, the 1st and 4th Air Forces have had fighter units only, the 2nd has had heavy bombardment only, and the 3rd has had medium and light bombardment and fighter units. Heavy bombardment training is being added in the 3rd Air Force.

To give greater effectiveness to these combined operations, it is planned to increase the minimum flying-time requirements for fighter RTU pilots, now sixty hours.

As another form of combined operation training, the 3rd Air Force has two groups working with units of the Army Ground Forces on tactical maneuvers.

As soon as practicable, all instrument instructors will be graduates of the AAF Instructors School (Instrument Pilot), Bryan, Texas. A set of minimum qualifications for instructors has been established as a temporary measure until AAFIS graduates can be used exclusively.

Since September 1, the Training Command has been able to furnish to the training air forces qualified four-engine airplane commanders in sufficient numbers so that transition training in the air forces is unnecessary. This will mean that additional time will be allowed to turn out better OTU groups and RTU replacements.

SMART OPERATOR

Tech. Sgt. Herman Sachnoff is the type of individual who thinks you can believe about half of what you hear. On the way to a bombing target in the Mediterranean theatre, this B-25 radio operator received a message—in the proper code of the day—to change course and attack a different objective.

The message seemed proper enough, being correctly coded, but Sachnoff became suspicious. At that particular spot over Africa he had never been able to get strong signals from his base, and this message came in surprisingly clear. By using his radio compass the sergeant was able to determine that this message was coming from a direction ahead of his position, although his base was located

in the rear. Realizing now that it was an enemy message, he radioed back to his base, warning them of the fake. The B-25s proceeded to the original target.

On the way home, the sergeant's flight passed about 150 Allied fighters heading at 30,000 feet toward the false target. When these fighters reached the area to which the attempt had been made to lure the B-25s, they found 45 Messerschmitts circling at 20,000 feet, waiting to ambush the B-25s. The Allies dove on the MEs and destroyed thirty of them. Sergeant Sachnoff received the Distinguished Flying Cross—for being the type of guy who doesn't believe everything he hears.

Gentlemen Be Seated

Although maintaining planes in fighting trim is their big job in combat, ASC personnel in theatres of operations frequently are called upon to perform tasks which are but remotely related to keeping 'em flying. From the 9th Air Service Command in the Middle East comes the report that a squadron CO, Capt. E. P. Kapal, was more than a little annoyed when his trained aircraft woodworkers were given the job of turning out a batch of toilet seats for the boys. However, the craftsmen laid to with a will and produced more than 1,000 seats in two weeks. These were considered ample for the moment.

Family Spirit

You can add up the achievements of the Army Air Forces in many ways, but sooner or later you become aware that our victories are won as much by the spirit of our men as by the excellence of our equipment and the superiority of our methods.

That spirit builds up into what we know as a "family feeling," a relationship among personnel that characterized the Air Corps when it was so small the Commanding General knew virtually every officer and enlisted man by name. Somehow, over the years, it has been maintained, even in an organization that exceeds two million men.

The family spirit manifests itself in the desire of Air Forces personnel to "look after their own," and often reaches outside the service to encompass the relatives and friends of men who go down in line of duty. One such example is this letter to the Commanding General from a father who lost his pilot son in action. The letter reads:

Dear General Arnold:

This letter is the quite unexpected and unanticipated sequel to letters I wrote to you and General Marshall early last May. Added to what I wrote then, it completes the story of what *must* be the *perfect* example of what you wish every unit in your Air Forces could do for every flyer killed in action, and his family.

When I wrote you in May, I believed that it would be impossible for any squadron to do more, or more promptly, than the men of the ——— Squadron did for our late son, Captain ——— and his folks.

But I was wrong, for in July Major ———, Squadron Intelligence Officer, took time from his short leave with *his* family to visit us. With him he brought intimate stories of Jack and the squadron, a picture of Jack snapped the morning of his last flight and a priceless memento of their long trip across the desert . . .

Then, about three weeks ago, our son's close friend who was with him on that last flight spent a day with us. He filled in a lot of the background. We heard his stories, saw his souvenirs, read his diary, saw his pictures, and everything proved to us that our son had been well, happy and lucky until that last second.

But the grand climax, which I don't think any human being or organization could plan or produce, came about ten days ago at ——— Field. The occasion was the formal military presentation of three posthumous awards to Jack, with his mother, his little sister and myself present to accept them.

The arrangements had been made most thoughtfully and considerately through correspondence with the Special Awards Office, AAF, Washington.

The day was perfect and we looked forward to meeting at least one member of the ——— squadron at the ceremonies.

Now, the miracle! Can you imagine the thrill, the joy and the prideful consolation we experienced when our escort, Lieutenant ———, took us into the Base Officers Club, there to find *seven* men from Jack's squadron who had trickled in from north, south, east and west by noon that day—together, themselves, for the first time since they had started coming home five and six months ago!

"Furthermore, we don't announce approaching Jap planes by saying 'Ceiling Zero'!"
—J. T. RAWLS & SGT. P. J. KAATZ.

I'll never know how it happened or who was responsible. Maybe you and God. But how they all heard about it, how that date fitted into their seven different schedules of duties, transfers, leaves, etc., so that they could all turn up that Friday afternoon for their buddy's "last commencement"—well, that's something I've quit trying to figure out; for in that group of four majors and three captains were all Jack's squadron officers—the men who'd written us those marvelous letters, sent us the photographs taken where and when they found our son's grave—tentmates and classmates from cadet days, men we *felt* we knew and had known well for the past year and a half. Of course, we had dreamed of meeting all of them somehow, someday, but always admitted that it was only dreaming. Such things don't happen, for the world keeps moving—and *fast*—in wartime. Yesterday's dead heroes and yesterday's "decisive" victories soon become old stories, akin to Civil War heroes and Gettysburg, for new battles and new buddies, fortunately, soon take the place of the old for soldiers.

Knowing this, we consider ourselves blessed above any other parents of whom we have ever heard. Like many thousands we have lost a son in action, but unlike most others we have had the rare consolation of the unbelievable chain and combination of circumstances listed in this and previous letters.

I feel sure that if it were in your power to do it, you would wish every family to receive the same breaks that have been ours, when death takes a flying son under your command. But you can't put such a perfect "military operation" in the rule books.

To top off the marvelous demonstration of "esprit de corps" in your Air Forces, we learned *that* Friday night that taking part in the military review that day were some fifteen Air Forces enlisted men who had known our Jack seven to fifteen years ago, back in grade school. When they heard of the award ceremonies, they voluntarily cancelled their weekend leaves and begged to be allowed to march with the selected squadron. And they did. We don't know who they were, even.

But that ought to make you feel almost as happy as it did us, an evidence of the extent and character of the high morale you've worked so long and hard to inspire in the Air Forces.

Because I feel that you have set the tone and standards for the Air Forces which developed in our case, into this incomparable story, I have written to thank you.

Sincerely,

———

The Glider Training Program

The Training Command again is accepting applications from AAF enlisted personnel for glider pilot training.

Enrollments were cut sharply a few months ago. A number of men were dropped from the course and assigned to domestic air forces. Increased current requirements, however, have caused the Training Command to reopen the enrollment on a limited scale.

Glider pilot training is available only to volunteers between 18 and 37 who have completed basic military training. They must have evidence of having flown at least 125 hours as an aircraft or glider pilot, including a minimum of 25 hours within the past year.

Applications should be submitted through channels to Headquarters, AAF Training Command, Fort Worth 2, Texas.

Final Warning

A list of names, recently posted on the bulletin board of a squadron at Harlingen (Tex.) Air Field, was accompanied by these terse instructions: "The following enlisted men will pick up their Good Conduct Medals at the supply room this afternoon. Failure to comply with this order will result in disciplinary action!"

Candy and Kids

Staff Sgt. Ronald R. O'Neil, 43-year-old combat cameraman in England, wanted to celebrate the seventh birthday of his little boy back in the States. Since he couldn't be with his own son he decided to entertain seven boys, all seven years old, on his son's birthday. In preparation for the celebration, O'Neil began

saving his candy and gum rations. When the boys in the mess hall heard of the plan they gave the project a hefty boost by volunteering to bake a huge birthday cake with all the trimmings for the party. Meanwhile O'Neil's buddies in the combat camera crew tossed their candy and gum rations into the pool. By then there was enough for sixty kids. When the party was held the guests of honor were seven boys, seven years old—but 53 other children from an English orphanage were also invited. Sergeant O'Neil served a hitch in the other war and has another son with the AAF in Sicily.

Draw One

A bomber group at an advanced base in northeastern India had not received its regular ration of beer. To expedite the matter they sent a B-25 down to Calcutta to pick it up. The pilot whizzed down and took aboard 3,000 pounds of canned beer. When he got back the pilot gave the field an excellent buzzing. When he pulled up, however, the bomb bay doors opened and the installation was given a terrific beer bombardment. One officer, sitting in his quarters, vows that a case came flying through an open door, slid across the floor and out an exit at the other end. We have learned from witnesses that most of the beer was salvageable.

Parachutes—Lost and Found

Lost:

Numbers 42-31759, 42-3757, 42-37259, 42-37325, 42-37345, 41-6358, 40-1151, 40-2174, 40-1354, 40-1262, 40-1251. Return to Office of the Engineering Officer, Base Engineering, APO 839, care of Postmaster, New Orleans, La.

Numbers 41-10499 and 40-516. Return to Office of the Engineering Officer, 73rd Sub-Depot, AAF Bombardier School, Midland, Texas.

Numbers 42-281807, 42-442071, 42-331000, 42-324870, 42-442928; return to Property Adjustment Board, Municipal Airport, Nashville, Tenn.

Number 42-92320, detachable type; return to Operations Office, Headquarters Midwestern Procurement District, Municipal Airport, Wichita, Kansas.

Numbers 39-153, 42-289607, 42-389261. Return to Headquarters and Headquarters Squadron, 1st Tactical Air Division, Morris Field, Charlotte, N. C.

Number 42-292819, (Type S-1); return to Office of Operations Officer, 57th Fighter Squadron, Bartow Army Air Field, Bartow, Fla.

Number 41-41586 (Type B-7); return to 57th Bombardier Training Squadron, Kirtland Field, Albuquerque, N. M.

Number 41-9061 (Type S-1), No. 42-144998 (Seat type); return to Base Operations Officer, Kindley Field, Bermuda.

Found:

Number 42-668816 is held by Headquarters, Air Cargo Depot Detachment, Air Service Command, 179 E. 8th St., St. Paul, Minn.

Number 41-15817 (Type S-1) is held at Office of the Supply Officer, Headquarters 71st Sub-Depot, Key Field, Meridian, Miss.

Numbers 42-409548 and 42-652279 (Type S-1) held by Base Operations Office, Army Air Base, Lincoln 1, Nebr.

'Air Corps Airs'

As a follow-up to our mention of "Air Corps Airs" last month, we report that it covers songs airmen have sung since 1921. The new song book naturally includes the official song of the AAF and from there takes off in every direction from "Wings on High" to "The Ground Crew," not forgetting that well-mated pair "He Wears a Pair of Silver Wings" and "Round Her Leg She Wore a Purple Garter." The flight runs from stout-hearted "Sons of Randolph" right down the line to "Beside the Brewery at St. Mihiel."

The book is bound in blue, water-repellent stock with the Air Corps insignia prominently displayed in gold. The songs are divided into five sections classified as Popular Songs, 1922-1943; Hymns, A West Point Interlude, Light-Hearted Songs of Death and Destruction, and Post War. This book was made possible from an editorial standpoint largely through the efforts of Mrs. Barton K. Yount, wife of the commanding general of the AAFTC, and Harry Fox, president of the Music Publishers Protective Association, who handled the considerable chore of dealing with copyright owners. Thirty-two publishers gave releases for songs in the book.

Better to Give. . . .

Sixty-five American soldiers responded recently when the British Red Cross asked for volunteer blood donors at an ASC supply depot of the 8th Air Force. It all started when the British Red Cross asked Capt. Al Ryan, group surgeon, to aid in obtaining plasma. So great was the response of Americans that the appeal had to be suspended after all the bottles had been used. The men have asked for another chance to help their Allies, however, and a second blood bank will be conducted.

Pin-up Boy

The picture of a commanding general appearing on the office walls of his staff is not at all unusual, but it is news when a commanding general asks for the photograph of a flyer to hang on his own wall. Lieut. Gen. George C. Kenney, commanding the 5th Air Force, made such a request when he learned that Capt. George P. Dunmore, a bombardier, had sunk six Jap ships for a total of 20,500 tons—a record that other bombardiers in the area have yet to equal.

Post War Planning

One of our scouts has just returned from an airbase in the midwest where he met a comely WAC lieutenant stationed at the base engineer's office. In the course of conversation, it developed that this girl was a Chicago debutante before joining Colonel Hobby's ranks, with a flair for night life, low-cut evening gowns, orchids and champagne. All in all, it was a sudden change-over to her trim, tailored, olive drab service clothes. However, the girl seems to have found some compromise. Each payday she goes downtown and buys herself the sleekest, laciest night gown she can find. She never wears them. Just folds them away in her foot-locker.

"Everytime I get depressed I open my locker and look at them," she explained to our scout, who retired in disorder.

—The Editor.

"Was that Focke-Wulf at eleven o'clock *'standard'* or *'war'* time?"

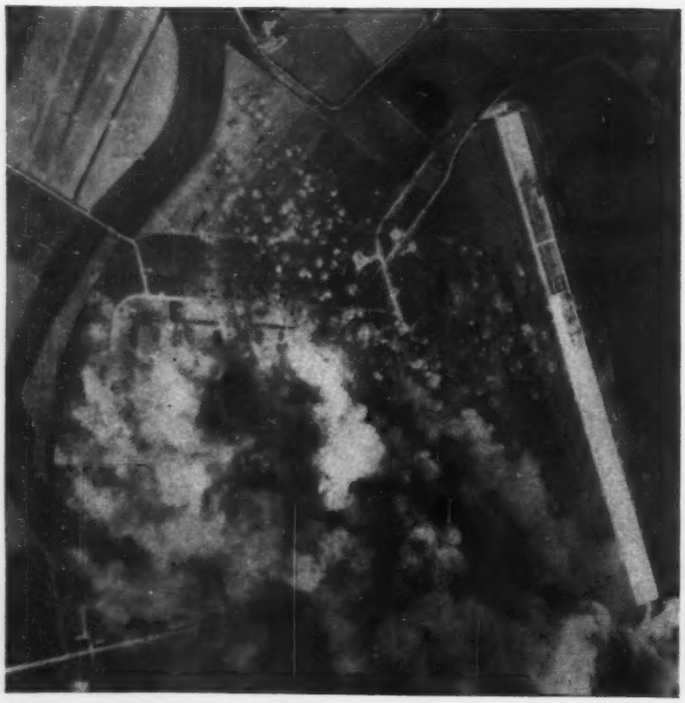
—Fritz Wilkinson

1—On October 9, in their deepest penetration into Germany to date, B-24s and B-17s of the Eighth Air Force attacked as one of their targets the Focke-Wulf 190 factory at Mariensburg in Eastern Prussia.

2—General Arnold has termed this attack the finest examples of daylight precision bombing. In the photo above, the first bombs blast the factory, one of the Nazis' largest plants for fighter aircraft assembly.

Knockout Punch

3—Bomb bursts and fire billow up into an enormous mushroom of smoke and debris over the vital target as showers of missiles find their mark.



4—Reconnaissance photo after the attack shows the assembly shops, hangars and other structures entirely devastated by the accurate bombing.

RETURN FROM COMBAT

How the Army Air Forces are pioneering in a program for handling personnel coming back from the war zones.

THE Army Air Forces have set up a redistribution program to insure the proper handling of all personnel—officers and enlisted men—returning from overseas theatres of operations.

Without precedent in the armed forces of the United States, the overall plan provides as its major objectives:

(1) That men returning to the States for change in duty assignment are properly conditioned mentally and physically to assume new duties.

(2) That the right men are placed in the right jobs.

(3) That battle casualties are afforded the best possible treatment.

(4) That guidance toward civilian reemployment is given, when required, in cases where a physical disability discharge is indicated.

The redistribution program has been developed by the office of the Assistant Chief of the Air Staff, Personnel, and because of its widespread application and definite departure from the old hit-or-miss assignment system, progress of the plan is being watched by other branches for possible adaptation to the entire military service.

As a supervising agency for the program, the AAF Redistribution Center has been established within the office of the A/C of Air Staff, Personnel, and headquartered at Atlantic City, N. J. The Center will act with full authority and in close coordination with the Office of the Air Surgeon.

Necessity for a redistribution program of some sort became apparent last winter, coincident with the increase in the number of returnees from overseas theatres. It was evident that several thousand returnees would have to be processed each month and there was no well-formulated system for accomplishing this. In the absence of a better method, assignments were made on the basis of reports and personnel records. The inevitable result: men reported for duty before they were sufficiently rested and before they had appetites for new jobs—and there were many misfits.

The Air Forces' solution to the problem is based on the premise that each returnee must be handled as an individual, not as a number which represents certain basic qualifications. As a result, the AAF program provides individual planning for every man returned to the States from overseas. The schedule is detailed: exactly what the returnee will do from the day he gets his farewell processing at his overseas station until he reports for his new assignment, or is given his discharge from the service for physical disability. The time consumed by the reassignment schedule will depend upon the circumstances—the returnee's and the Army's—but in no case will the returnee report for a new assignment until the AAF is satisfied that he is fit, ready and correctly placed.

Officers in charge emphasize that the program is still in the experimental stages. It is just getting into operation, and it will grow as the load grows.

As the program is now shaping up, here's what will happen to you as a returnee from a combat zone:

Any one of four reasons might account for your being sent back to the United States for reassignment:

(1) Your turn might come up in a regular rotation of overseas assignments.

(2) The Air Forces might feel that your skill and experience are needed back home.

(3) You might be suffering from fatigue.

(4) You might be disabled and in need of hospitalization.

Before you leave your overseas station, you are given a thorough physical examination and provided with clothing and equipment needed for the journey home.

At the embarkation point, Army doctors look you over again to determine whether you have a communicable disease. A recheck is made on your uniform, equipment and personnel records.

Now, assuming that you are returning by boat, you are assigned to a "reception station group" according to your home state. For example, if from Kansas, you and all the other Kansans in your contingent are assigned to the same group. The ranking officer in each group becomes the group leader.

The exception to the geographical group system is the man who is sick or injured and requires hospitalization. He returns on a hospital boat, and upon arrival to a U. S. port of debarkation is taken immediately to an Army General Hospital. It may be the hospital nearest the port or the nearest one that specializes in the kind of treatment he requires.

The boat on which you and your Kansas friends are riding docks, say, at New York City. There, you are given another physical checkup. What happens to you from that point depends on which of three physical groups you belong in:

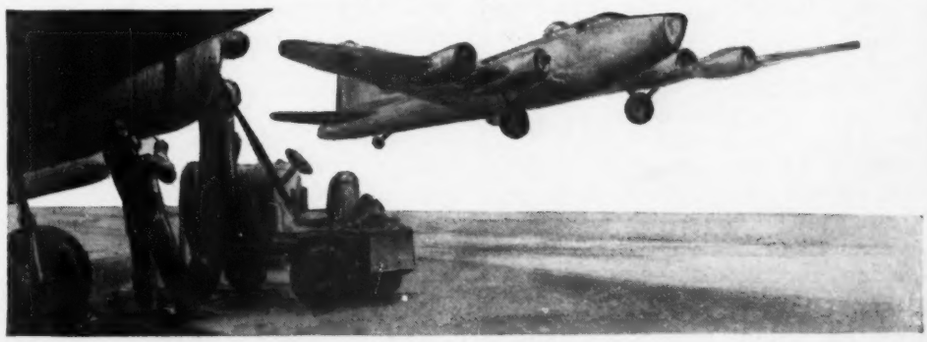
(1) Those requiring no medical treatment.

(2) Those suffering from operational fatigue.

(3) Those requiring treatment in a general hospital.

If you are in the first group, you join the other Kansans who are physically fit and board a train on which reservations have been made for you. You are still under the command of your Kansas group leader, and you travel at government expense to the interior reception station of the Army Service Forces nearest your home.

At that point your personnel records are checked and brought up to date. Assisted by a liaison officer of the AAF, you draw any uniform and equipment items needed for the furlough you are about to get. Then for twenty days you are free to go home or any other place you choose.



THEATRE OF OPERATIONS
EMBARKATION POINTS
Physical checkup for communicable diseases; equipment checkup; assignment to groups according to home locations.
AAF STATIONS
Complete physical examination; returnees draw clothing and equipment for journey.
UNITED STATES
DEBARKATION POINTS
Physical checkup; disposition according to physical condition.
3
Returnees requiring hospitalization in general hospital

FLOW OF AAF PERSONNEL RETURNED FROM OVERSEAS

CHART BY JAMES T. RAWLS AND PFC. EDWARD R. COLLINS

Furlough travel is at your own expense.

Returnees in the second group—those suffering from operational fatigue—are sent from the port of debarkation directly to an AAF convalescent center for treatment, rest, observation and—when their condition permits—military and physical training. If it appears that a returnee's condition will not permit his return to military duties, he is given vocational training to help him obtain and hold a job when he is discharged from the Army.

The first convalescent center has been opened at Coral Gables, Fla. Others are being organized at Mitchel Field, N. Y., Jefferson Barracks, Mo., San Antonio, Tex., Buckley Field, Colo., Santa Ana, Calif., and Fort George Wright, Wash.

Members of the third group—those requiring hospitalization—are treated in a general hospital and later sent to a convalescent center. Men who make the return crossing by air are handled in the same manner as those who arrive by boat. Upon debarkation at Miami, Fla., for example, the schedule at the airport is similar to that at the ship landing point.

But to get back to you and the home folks in Kansas, upon the expiration of your 20-day furlough, you will report to an AAF redistribution station in the general geographical area of your home, where your quarters for the next couple of weeks will be a hotel which not long ago was catering to vacation clientele. It has been leased by the government to house you and other returnees while personnel officers study your case and decide on your next job.

Two redistribution stations are now operating, one at Miami Beach and the other at Atlantic City. A third is being established on the west coast and a fourth in the midwest.

Your rank will not affect the treatment you get in the redistribution center. Whether you are an officer or an enlisted man, you will have a roommate, and you will get the same food, the same accommodations and the same attention from personnel officers as your superiors and inferiors.

Your program will be planned for you, but ample time will be left for pursuits of your own choosing. You will be urged to enjoy your time in this station. The personnel officers want to see you under the best possible conditions. They want you to be in a good frame of mind. They want to separate you from a barracks atmosphere.

Without hurry or bustle, they will give you orientation talks and interview you. There will be no punch-card system to find your slot, no heads-you-go-here, tails-you-go-there. You *(Continued on Page 8)*

1 Returnees not requiring medical treatment

INTERIOR RECEPTION STATIONS

Personnel records brought up to date; uniforms and equipment checked and necessary replacements made; furloughs granted.

HOME ON FURLOUGH

Approximately 20 days.

REST CAMPS

Rest; recreation; orientation; conditioning.

2 Returnees suffering from operational fatigue

AAF REDISTRIBUTION STATIONS

Orientation; personal interviews; equipment checkup; physical examination; assignment; rest; recreation.

AAF CONVALESCENT CENTERS

Treatment, rest and observation; military, vocational and physical training.

GENERAL HOSPITALS

Treatment for disability.

DISCHARGE FOR PHYSICAL DISABILITY

Guidance toward re employment as required.

DUTY ASSIGNMENT

will be an individual as well as a soldier, with problems and preferences and skills and shortcomings.

It may develop, of course, that the personnel officers will decide you still aren't ready for a new assignment. Perhaps you are more fatigued than you yourself realized.

In that event you will not be sent directly from the redistribution station to your new assignment. If you appear to be a severe fatigue case, you will be sent to a convalescent center. But more likely, you will go to a rest camp, an AAF station set up for the kind of recreation and relaxation that will condition you for a new job.

THE returnees who go to rest camps aren't patients. They don't receive treatment, as such. But they do go fishing, play golf, swim, get a lot of sun and a lot of exercise. How long a man stays depends upon his condition and how quickly he responds to the good life he lives.

Two rest camps are in operation, one at Lake Lure, N. C., and another at Castle Hot Springs, Ariz. A third will be established in the midwest and a fourth on the west coast.

From the rest camps and convalescent centers alike, returnees funnel back through the redistribution station. That applies to men who go to the convalescent center directly from the port of debarkation as well as those who are assigned to the center from a redistribution station.

As another important part of the redistribution program, plans are being made to help find jobs for men who are discharged for physical disability. Personnel officers are coordinating this program with other organizations engaged in such activities—the War Manpower Commission, the Selective Service System, the U. S. Employment Service and the Red Cross.

The AAF is in position to know—and to recommend to prospective employers the kind of industrial job that would utilize the training an individual has had in service or in a convalescent center. As a preliminary step in making certain that such training is utilized, the redistribution organization is preparing a manual to show specifically the list of jobs for which each type of AAF service could be expected to qualify a man.

The redistribution system is set up to handle the gradually increasing load of returnees from overseas. Obviously, it would not be equipped to handle a greatly increased load with such thoroughness. The program, therefore, must remain flexible.

The post-war problem, when the load will reach flood proportions, is another matter. It is expected that the AAF redistribution system will help to point the way toward solution of personnel problems when the day of victory comes. ☆

FLIGHT NURSE

By Lieut. Henrietta Richardson

ONE HUNDRED AND THIRTY-TWO hours of combat evacuation flying in North Africa convinced me that the psychological effect of the presence of an American nurse on duty in actual flight is sometimes just as important to our wounded men as her attention to their physical comforts.

During the two months I served with our Evacuation Squadron as a flight nurse we flew an evacuation mission a day, sometimes totalling 87 hours a month. My chief job was to see that the wounded men—usually eighteen patients to a plane—were made as comfortable as possible in the flight from front lines to base hospital. This meant giving medications and hypodermics to ease pain, reinforcing bandages, administering oxygen and blood plasma when needed, or just handing out some rations to patients who were hungry.

But in those planes, thousands of feet above the earth, I found that a nurse can have a definite morale effect on these men, and therein lies perhaps the hardest part of our jobs. Each patient requires individual attention. Many of them are seriously wounded and are suffering from those first few hours or days of shock. They have not yet had time to adjust themselves to their handicaps. In many cases this state of extreme sensitivity on their part calls for all the tact and understanding a flight nurse can give them.

One of the boys may be bursting to tell you how he got his leg shot off. Just telling his story to someone who will listen seems to have a real therapeutic value. He gets it off his chest, every little detail, and then he seems to feel better. And very often, I've found they tell you things they probably wouldn't mention to their own buddies.

On the other hand, on the same ship you might have another patient who doesn't even want you to mention his wounds or how he got them. He just won't discuss it—or anything. So you learn when to try to cheer up people, and when to keep your mouth shut.

Most of them just want you to listen to them. You should see their eyes light up when they see an American girl on the plane. "Gosh," they exclaim, "a nurse! And on an airplane." They seem to think it really quite wonderful. They fire questions at you. How long have you been over here? Where do you come from? Do you know so-and-so there?

Here, when they need her most, is an American girl to talk to. For the short duration of that flight, any flight nurse for the moment is mother-sister-wife and the girl-they-left-behind, all in one. They want to tell you everything—what that girl looked like (and if they're lucky enough to still have her picture they'll drag out an old, worn wallet and show you her photo, or maybe it's a snapshot of the young son they haven't seen), or they talk about that job they had in Oregon before the war, or that big time one night down in "San Antone."

Chiefly, they want to know how soon they can get back in action. Even the most seriously wounded want to get back for another crack at the Nazis. One curly-haired kid we brought to Oran one day had lost his leg in a B-26 gun turret. All during the flight he kept talking about going back to the States, getting fixed up with an artificial leg so he could come back and fly in that B-26 again.

The one thing you never hear from any of these men is one word of complaint. You ask them if they need anything, but you practically have to beat them over the head before they'll admit they would feel better with a dressing changed. "I'm all right," they will say. "Maybe somebody else wants something." ☆

PICTURE CREDITS

FIRST, THIRD AND FOURTH COVERS: AIR FORCE Editorial Office staff photos. 22-23: Acme News-pictures. 28-29: AIR FORCE STAFF and AAF. 30-31-32: Office of Flying Safety. 35: Roger's Studio, New Haven, Conn. 44-45: AAF First Motion Picture Unit. 51: Boeing Aircraft. All other photographs secured through official Army Air Forces sources.

REGENSBURG MISSION

By LIEUT. COL. BEIRNE LAY, JR.

8TH AIR FORCE

THIS report does not attempt to render a complete summary of the mission. It is merely an eyewitness account of an ordeal in which our group fought its way through fierce and prolonged enemy fighter attacks and accurately bombed a vital target.

When our group crossed the coast of Holland at our base altitude of 17,000 feet, I was well situated to watch the proceedings, being co-pilot in the lead ship of the last element of the high squadron. With all of its 21 B-17Fs tucked in tightly, our group was within handy supporting distance of another group, ahead of us at 18,000 feet. We were the last and lowest of the seven groups that were visible ahead on a southeast course, forming a long chain in the bright sunlight—too long, it seemed. Wide gaps separated the three combat wings.

As I sat there in the tail-end element of that many miles long procession, gauging the distance to the lead group, I had the lonesome foreboding that might come to the last man about to run a gauntlet lined with spiked clubs. The premonition was well founded.

Near Woensdrecht, I saw the first flak blossom out in our vicinity, light and inaccurate. A few minutes later, two FW-190s appeared at one o'clock level and whizzed through the formation ahead of us in a frontal attack, nicking two B-17s in the wings and breaking away beneath us in half-rolls. Smoke immediately trailed from both B-17s, but they held their stations. As the fighters passed us at a high rate of closure, the guns of our group went into action. The pungent smell of burnt powder filled our cockpit, and the B-17 trembled to the recoil of nose and ball turret guns. I saw pieces fly off the wing of one of the fighters before they passed from view.

(On August 17 heavy bombers of the 8th Air Force carried out a double-edged attack against the German roller bearing works at Schweinfurt and the Messerschmitt plant at Regensburg. Despite what was termed the "greatest daylight aerial battle in history," targets were bombed successfully. Our losses have been estimated at 59 B-17s, against an enemy loss of 308 fighter planes. This is the report of a co-pilot on the mission, as it was submitted to his CO, with only a few deletions for security.—THE EDITOR)

Illustrated by Capt. Raymond Creekmore

Here was early action. The members of the crew sensed trouble. There was something desperate about the way those two fighters came in fast, right out of their climb without any preliminaries. For a few seconds the interphone was busy with admonitions: "Lead 'em more . . . short bursts . . . don't throw rounds away . . . there'll be more along in a minute."

Three minutes later, the gunners reported fighters climbing up from all around the clock, singly and in pairs, both FW-190s and ME-109Gs. This was only my fourth raid, but from what I could see on my side, it looked like too many fighters for sound health. A coordinated attack followed, with the head-on fighters coming in from slightly above, the nine and three o'clock attackers approaching from about level, and the rear attackers from slightly below. Every gun from every B-17 in our group and the one ahead was firing, criss-crossing our patch of sky with tracers to match the time-fuze cannon shell puffs that squirted from the wings of the Jerry single-seaters. I would estimate that 75 percent of our fire was inaccurate, falling astern of the target—particularly the fire from hand-held guns. Nevertheless, both sides got hurt in this clash with two B-17s from our low squadron and one other falling out of formation on fire with crews bailing out, and several fighters heading for the deck in flames or with their pilots lingering behind under dirty yellow parachutes. Our group leader pulled us up nearer to the group ahead for mutual support.

I knew that we were already in a lively fight. What I didn't know was that the real fight, the *anschluss* of Luftwaffe

20 mm cannon shells, hadn't really begun. A few minutes later, we absorbed the first wave of a hailstorm of individual fighter attacks that were to engulf us clear to the target. The ensuing action was so rapid and varied that I cannot give a chronological account of it. Instead, I will attempt a fragmentary report, salient details that even now give me a dry mouth and an unpleasant sensation in the stomach when I recall them. The sight was fantastic and surpassed fiction.

It was over Eupen that I looked out of my co-pilot's window after a short lull and saw two whole squadrons, twelve ME-109s and eleven FW-190s climbing parallel to us. The first squadron had reached our level and was pulling ahead

"The first squadron had reached our level . . ."

to turn into us and the second was not far behind. Several thousand feet below us were many more fighters, with their noses cocked at maximum climb. Over the interphone came reports of an equal number of enemy aircraft deploying on the other side. For the first time, I noticed an ME-110 sitting out of range on our right. He was to stay with us all the way to the target, apparently reporting our position to fresh squadrons waiting for us down the road. At the sight of all these fighters, I had the distinct feeling of being trapped — that the Hun was tipped off, or at least had guessed our destination and was waiting for us. No P-47s were visible. The life expectancy of our group suddenly seemed very short, since it had already appeared that the fighters were passing up preceding groups, with the exception of one, in order to take a cut at us.

Swinging their yellow noses around in a wide U-turn, the twelve-ship squadron of ME-109s came in from twelve to two o'clock in pairs and in fours and the main event was on.

A shining silver object sailed past over our right wing. I recognized it as a main exit door. Seconds later a dark object came hurtling through the formation, barely missing several props. It was a man, clasping his knees to his head, revolving like a diver in a triple somersault. I didn't see his chute open.

A B-17 turned gradually out of the formation to the right, maintaining altitude. In a split second, the B-17 completely disappeared in a brilliant explosion, from which the only remains were four small balls of fire, the fuel tanks, which were quickly consumed as they fell earthward.

Our airplane was endangered by hunks of debris. Emergency hatches, exit doors, prematurely opened parachutes, bodies and assorted fragments of B-17s and Hun fighters breezed past us in the slip stream.

I watched two fighters explode not far below, disappearing in sheets of orange flame, B-17s dropping out in every stage of distress, from engines on fire to control surfaces shot away, friendly and enemy parachutes floating down and, on the green carpet far behind us, numerous funereal pyres of smoke from fallen fighters, marking our trail.

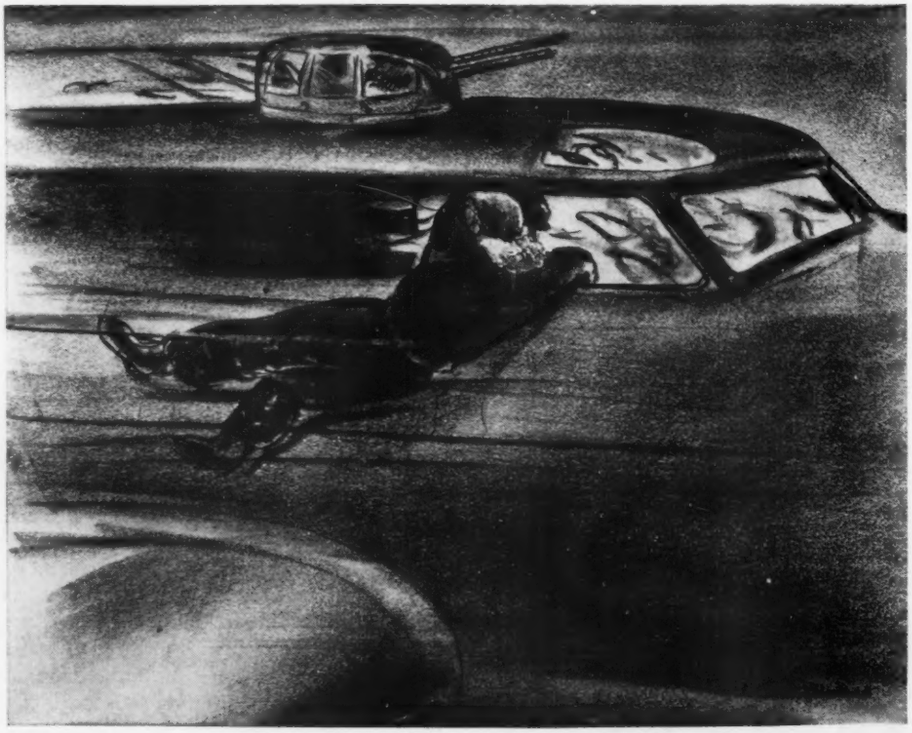
On we flew through the strewn wake of a desperate air battle, where disintegrating aircraft were commonplace and sixty chutes in the air at one time were hardly worth a second look.

I WATCHED a B-17 turn slowly out to the right with its cockpit a mass of flames. The co-pilot crawled out of his window, held on with one hand, reached back for his chute, buckled it on, let go and was whisked back into the horizontal stabilizer. I believe the impact killed him. His chute didn't open.

Ten minutes, twenty minutes, thirty minutes, and still no let up in the attacks. The fighters queued up like a breadline and let us have it. Each second of time had a cannon shell in it. The strain of being a clay duck in the wrong end of that aerial shooting gallery became almost intolerable as the minutes accumulated toward the first hour.

Our B-17 shook steadily with the fire of its fifties and the air inside was heavy with smoke. It was cold in the cockpit, but when I looked across at our pilot—and a good one—sweat was pouring off his forehead and over his oxygen mask. He turned the controls over to me for a while. It was a blessed relief to concentrate on holding station in formation instead of watching those everlasting fighters boring in. It was possible to

". . . reached back for his chute"

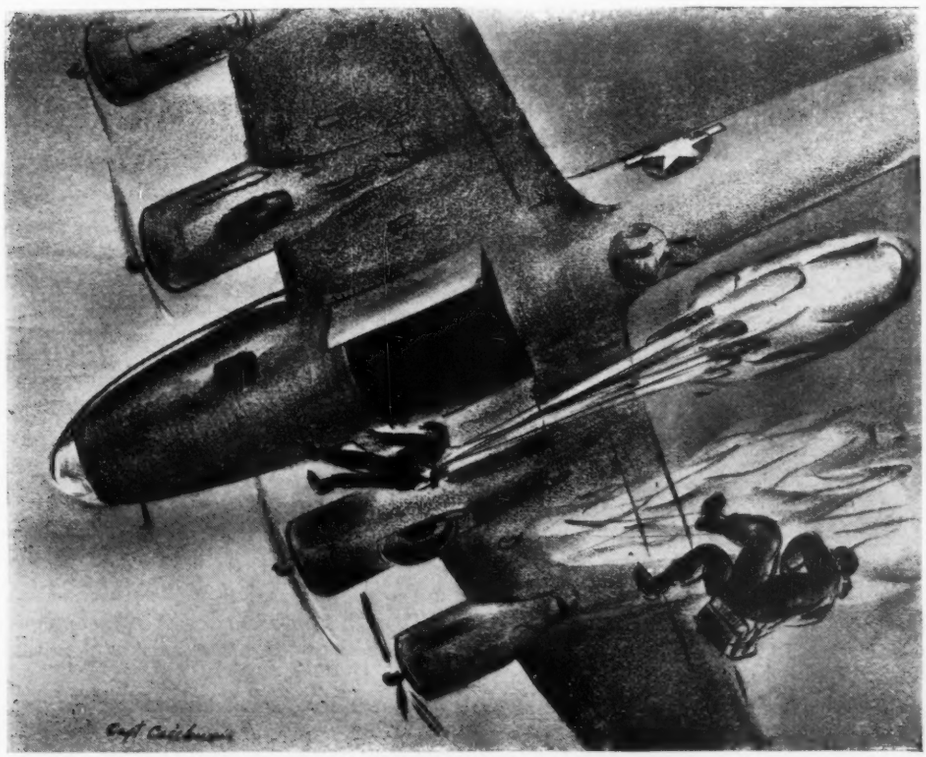


forget the fighters. Then the top turret gunner's twin muzzles would pound away a foot above my head, giving an imitation of cannon shells exploding in the cockpit, while I gave an even better imitation of a man jumping six inches out of his seat.

A B-17 ahead of us, with its right Tokyo tanks on fire, dropped back to about 200 feet above our right wing and stayed there while seven of the crew bailed out successively. Four went out the bomb bay and executed delayed jumps, one bailed from the nose, opened his chute prematurely and nearly fouled the tail. Another went out the left waist gun opening, delaying his chute opening for a safe interval. The tail gunner dropped out of his hatch, apparently pulling the ripcord before he was clear of the ship. His chute opened instantaneously, barely missing the tail, and jerked him so hard that both his shoes came off. He hung limply in the harness, whereas the others had showed immediately some signs of life after their chutes opened, shifting around in the harness. The B-17 then dropped back in a medium spiral, and I did not see the pilots leave. I saw it just before it passed from view, several thousand feet below us, with its right wing a solid sheet of yellow flame.

After we had been under constant attack for a solid hour, it appeared certain that our group was faced with annihilation. Seven had been shot down, the sky was still mottled with rising fighters and target-time still 35 minutes away. I doubt if a man in the group visualized the possibility of our getting much farther without 100 percent loss. I know that I had long since mentally accepted the fact of death and that it was simply a question of the next second or the next minute. I learned firsthand that a man can resign himself to the certainty of death without becoming panicky. Our group firepower was reduced 33 percent, ammunition was running low. Our tail guns had to be replenished from another gun station. Gunners were becoming exhausted and nerve-tortured from the prolonged strain, and there was an awareness on everybody's part that something must have gone wrong. We had been the aiming point for what seemed like most of the Luftwaffe and we fully expected to find the rest of it primed for us at the target.

Fighter tactics were running fairly true to form. Frontal attackers hit the low squadron and lead squadron, while rear attackers went for the high. The manner of their attacks showed that some pilots were old-timers, some amateurs, and that all knew pretty definitely where we were going and were inspired with a fanatical determination to stop us before we got there. The old-timers came in on frontal attacks with a noticeably slower rate of closure, apparently throttled back, obtaining greater accuracy than those that bolted through us wide out. They did some nice shooting at ranges of 500 or more yards, and in many cases seemed able to time their thrusts to catch the top and ball turret gunners engaged with rear and side attacks. Less experienced pilots were pressing attacks home to 250 yards and less to get hits, offering point-blank targets on the breakaway, firing long bursts of twenty seconds, and, in some cases, actually pulling up instead of going down and out. Several FW pilots pulled off some first rate deflection shooting on side attacks against the high group, then raked the low group on the breakaway out of a side-slip, keeping the nose cocked up in the turn to prolong the period the formation was in their sights.



"... one bailed from the nose, opened his chute prematurely"

I observed what I believe was an attempt at air-to-air bombing, although I didn't see the bombs dropped. A patch of 75 to 100 grey-white bursts, smaller than flak bursts, appeared simultaneously at our level, off to one side.

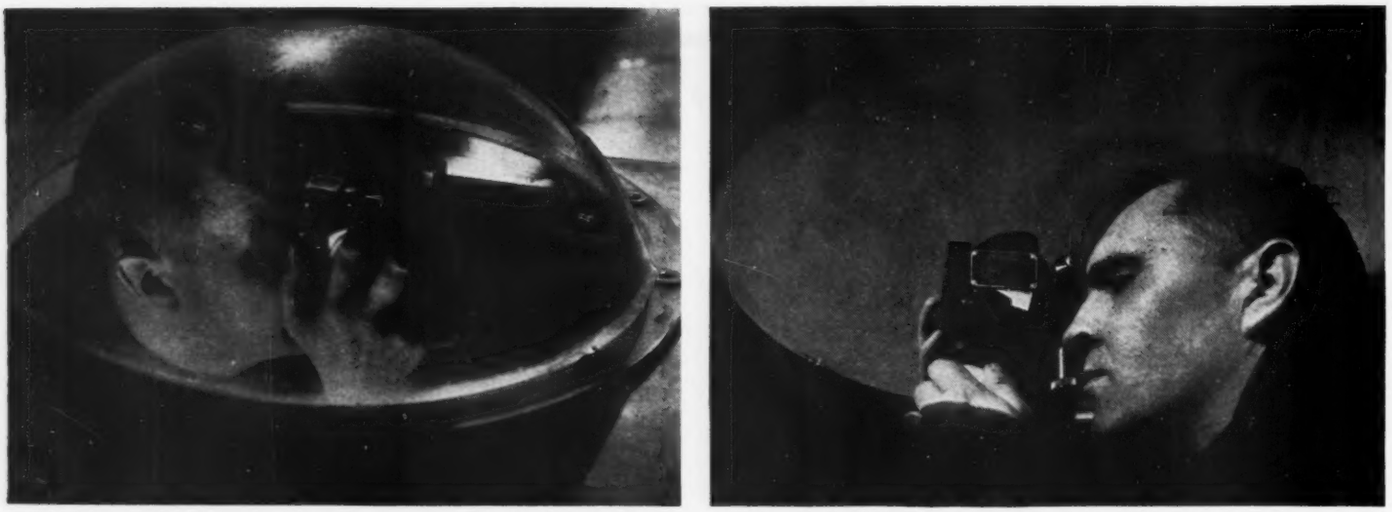
One B-17 dropped out on fire and put its wheels down while the crew bailed. Three ME-109s circled it closely, but held their fire, apparently ensuring that no one stayed in the ship to try for home. I saw Hun fighters hold their fire even when being shot at by a B-17 from which the crew was bailing out.

Near the I.P., one hour and a half after the first of at least 200 individual fighter attacks, the pressure eased off, although hostiles were nearby. We turned at the I.P. with fourteen B-17s left, two of which were badly crippled. They dropped out after bombing the target and headed for Switzerland. The No. 4 engine on one of them was afire but the plane was not out of control. The leader of the high squadron received a cannon shell in his No. 3 engine just before the start of the bombing run and went in to the target with the prop feathered.

Weather over the target, as on the entire trip, was ideal. Flak was negligible. The group got its bombs away promptly on the leader. As we turned and headed for the Alps, I got a grim satisfaction out of seeing a column of smoke rising straight up from the ME-109 shops, with only one burst over in the town of Regensburg.

The rest of the trip was a marked anticlimax. A few more fighters pecked at us on the way to the Alps. A town in the Brenner Pass tossed up a lone burst of futile flak. We circled the air division over Lake Garda long enough to give the cripples a chance to join the family, and we were on our way toward the Mediterranean in a gradual descent. About 25 fighters on the ground at Verona stayed on the ground. The prospect of ditching as we approached Bone, short of fuel, and the sight of other B-17s falling into the drink, seemed trivial matters after the nightmare of the long trip across southern Germany. We felt the reaction of men who had not expected to see another sunset.

At dusk, with red lights showing on all of the fuel tanks in my ship, the seven B-17s of the group still in formation circled over Bertoux and landed in the dust. Our crew was unscratched. Sole damage to the airplane: a bit of ventilation around the tail from flak and 20 mm shells. We slept on the hard ground under the wings of our B-17, but the good earth felt softer than a silk pillow. ☆



Proper position for the head and sextant in the spherical astro-dome is demonstrated (left) by Colonel Thurlow. This position allows for a minimum of refraction error. At right is shown the correct position as viewed from inside the plane.

HOW TO USE THE ASTRO-DOME

By Col. Thomas L. Thurlow

CHIEF, INSTRUMENT AND NAVIGATION UNIT, WRIGHT FIELD

NAVIGATION of the skyways has presented many problems in the short period of its existence. Most of them, however, have been solved by years of engineering and design and the introduction of "miracle gadgets" that have made possible our globe-girdling flights and operations.

Yet one drawback has been the human element—the proper use of navigational devices that go into present day aircraft. Currently we are faced with a problem regarding the use of the astro-dome in the navigator's compartment of medium and heavy bombers and cargo transports.

The spherical dome in use today is as near perfect as a dome can be, yet there are many navigators who will not trust celestial observations taken through it. This dome has several marked advantages over other types and therefore should be understood and used to the full extent of its capabilities.

Navigators are concerned with the passage of light through glass (or plastic) with parallel surfaces and through glass with wedged surfaces. A ray of light passing through "parall" glass or plastic executes a "jog" when cutting the substance, but its initial and final directions in space remain the same. The ray is displaced but it is not deviated and no error results. This is illustrated in *Figure 1A*. When a ray of light passes through wedged glass or plastic it is both displaced and deviated, as shown in *Figure 1B*. The deviation in this latter case causes an error in the observation.

Vision through a perfect spherical dome will be distorted unless the light rays which afford vision are collected at the center of the sphere by the eye, if scanning, or by the rotating sextant prism if observing.

WHEN the newcomer looks through the standard spherical dome now fitted to several types of AAF airplanes and discovers—to his amazement and worry—that the dome distorts his vision he immediately (and unwisely) condemns it. He is looking through an ever-varying wedge as he surveys surroundings through the dome and naturally there is a varying, noticeable distortion of the objects viewed. However, an important consideration is generally overlooked in such hasty condemnation. Light from a celestial body enters the dome in parallel rays. The only part of the light from a particular celestial body that a navigator can use is the small bundle of parallel rays that his eye receives—a bundle with a diameter equal to the diameter of the pupil of his sighting eye. During any one observation then, the navigator is using only a very small portion of the dome. To judge properly the quality of the dome, the whole of it except this small, pupil-size spot, should be rendered opaque. Then both deviation and distortion are so difficult to detect that they cannot be seen with the naked eye and must be measured with laboratory instruments.

Aerodynamic considerations demand that the navigator's dome be small. A full hemisphere cannot be tolerated and, as a result, a segment of a sphere has to suffice. The standard observing dome is a six-inch segment of an eleven-inch sphere. Several considerations influenced the selection of this particular sphere, and it is considered a very reasonable compromise.

Although the navigator uses only a small (pupil-size) area of the dome when making an observation, the surfaces of the area are "wedged." The amount of wedge varies with the measured altitude and with the position of the sextant. The effect of this positional error of the sextant and the reason for the existence of the wedge is illustrated in *Figure 2*. When the sextant is held quite close to the dome, the wedge effect—and hence the deviation—may become excessive. When it is held farther away, the wedge effect is generally reduced. These two conditions also are illustrated in *Figure 2*.

If the sextant is held in a fixed position with respect to the axis or to the flange of the dome, the refraction error will vary only as the measured altitude varies and can be allowed for. If this fixed sextant position is well away from the surface of the dome, the error will be at a minimum. To keep the dome shallow, and thereby aerodynamically "clean," it was designed to be used with horizontal line of sight sextants such as the A-10 and the new AN instrument. These instruments are now delivered with a support arm in the carrying case. The support arm can be attached to the metal fitting at the top of the dome with a standard aircraft bolt. The sextant incorporates an eye that permits it to be supported by the shock-mounted hook of the support arm. Thus,

the sextant is both supported and POSITIONED by the support arm. When the sextant is so positioned, the refraction varies only with the measured altitude. The following corrections are to be applied to the altitude measured:

Sextant Altitude	Correction
10	—2
20	—3
30	—4
40	—4
50	—4
60	—4
70	—4
80	—4

The quality of the standard dome is such that the above corrections should never vary more than two minutes of arc from dome to dome. This maximum variation is the price the navigator pays for complete sky coverage with a simple and light dome installation.

Some navigators claim fantastic refraction errors of one or two degrees. If errors differing more than a few minutes from those listed in the above table are encountered, they are due entirely to the position of the sextant in the dome. No such errors are possible when the support arm is used.

Although the support arm is a distinct aid and is strongly recommended, it is not an indispensable item of equipment. The sextant can be held easily in almost the exact position in which the arm supports it after one or two trials.

Every navigator should understand the operation of the astro-dome and learn to employ it correctly.

The support arm for the A-10 sextant and that for the AN sextant are designed to position the rotating prism of the sextant approximately one inch above the flange of the dome and slightly less than three inches from its axis, in the direction of the body being observed. When the sextant is in the position the observer's eye is slightly below the dome flange and the back of his head clears the dome by more than an inch.

The mounting holes in the flange of the dome are slotted to allow the dome to expand or contract with temperature changes. Therefore, care should be taken that the hold-down bolts are not pulled up too tightly. If the dome is distorted for this reason, serious refraction errors may result. Aircraft manufacturers apparently fail to take this into account, so the navigator should check this matter personally.

If the navigator does not have a support arm, he should learn to position his sextant correctly by practicing the following drill a few times. This drill applies only when using the A-10 and the AN sextants:

Set the sextant for zero degrees altitude.

Make a horizontal mark on the dome one inch above the flange.

Lower or raise the head in the dome until the horizontal mark on the dome when seen through the instrument bisects the field of view (or bisects the bubble if the dome is level). If the dome is not level take care that the vertical axis of the sextant is parallel to the axis of the dome.

Lean back until the head touches the dome, and then forward slightly for comfortable head clearance.

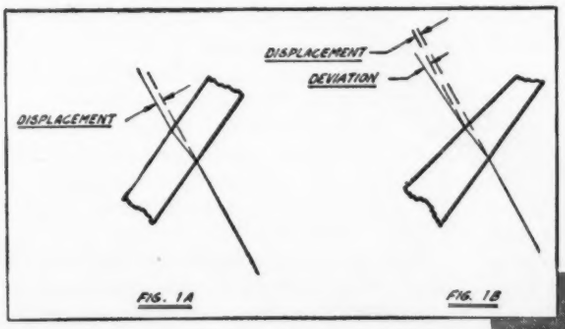
If the observer is sighting straight across the dome, that is, if he is not leaning to right or left, the sextant is being held correctly and the dome refraction errors of the foregoing table apply.

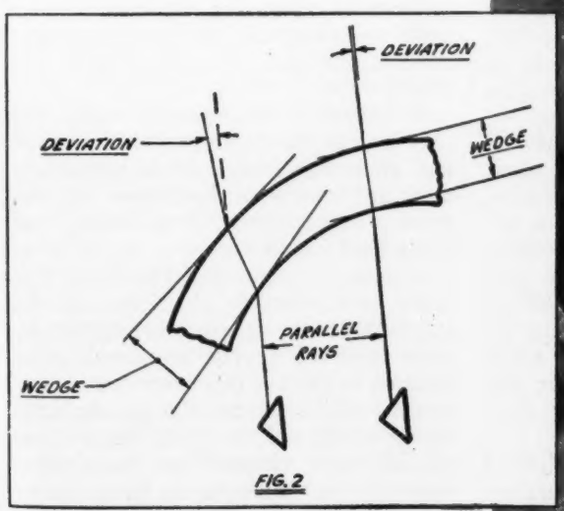
The standard spherical dome is not of sufficient height to permit the use of "down-sighting" sextants such as the A-5 and the A-7 instruments, or the A-6 and A-8 instruments when they are not being used for direct viewing of the body being observed.

Many navigators prefer the A-6, A-8 (Bausch and Lomb) and the A-12 (Link) sextants used as direct viewing instruments. When using these there is but one rule to observe: *Position the head so that the line of sight is perpendicular to the surface of that portion of the dome being used.*

This rule cannot be complied with when the altitude of the body observed is less than twenty degrees, and a correction of two minutes of arc should be applied to the measured altitude. Above twenty degrees, if the head is positioned in accordance with the above rule, no dome refraction correction need be applied.

The navigator should make every attempt to understand the operation of the astro-dome and to use it correctly before criticizing it. He should bear in mind that it required years of insistent persuasion to convince the aerodynamists and those concerned with aircraft performance that a sacrifice to help the navigator was necessary. The same people will be quite willing to remove the dome if the navigators themselves condemn it. ☆





In the flat glass dome of a trainer, the proper head and sextant positions are demonstrated.

OUR DEVELOPMENTS IN FIREPOWER

By COL. FRANK C. WOLFE
CHIEF, ARMAMENT LABORATORY, MATERIEL COMMAND

COMBAT experience has necessitated the re-arming of our fighting planes. The trend is toward new and significant developments in firepower, and our accomplishments are making American fighting planes the most formidably armed aircraft in the skies.

Our recent firepower development, as much of it as we can discuss at this time, includes:

- Heavier caliber machine guns.
- Heavier millimeter rapid-fire cannon.
- Hydraulic and electrically operated gun turrets with multiple gun installations.
- Remotely controlled and power-boosted and hand-held machine gun mounts.
- Remote control and fire control systems.
- Increased firepower for nose and tail positions of all types of bombers.
- Power-driven nose turrets in heavy bombers.
- Interchangeable nose turrets for a light bomber type.
- Multiple 37 mm cannon mounts in bombers for forward fire.
- Multiple gun turrets for night fighters.
- Forward-firing fixed 20 mm cannon in a light bomber type.
- Fixed gun installation for fighter aircraft to provide automatic corrections for lead, range, altitudes and speed.
- Improved computing sights for all gun positions.
- Emphasis on placement of guns to assure maximum protection.
- Fighter gunsights which extend present sighting ranges.
- Combination gunsights and dive bombsights.
- Personnel flak suits and armored helmets.
- Improvements in armor plate and bullet-resistant glass.
- Improvements in the gunsight aiming-point camera.

THE firepower problem is not new. Arming of aircraft dates back to the days at College Park, Md., in 1909 when the Wright brothers were training our first military aviators — among them today's Commanding General of the Army Air Forces, General Henry H. Arnold. There the first machine gun, carried in the lap of a passenger, was fired at a ground target from a flying machine. Crudely fashioned bombs also were taken aloft and dropped on targets.

Subsequent steps in converting the airplane into an effective military weapon were made during the first World War when Germans and Allies introduced new methods of fitting their planes with machine guns and bombs. As early as 1915 German observers flying over Paris fired rifles at French aircraft in the air. The French retaliated with automatic rifles. Later, machine guns mounted on the wing, shooting over the propeller, and located at various other positions on the airplane, were introduced. Next, guns were synchronized to fire through the propeller. From then on, Germans and Allies increased the firepower of their aircraft. The French used the first cannon, a 37 mm Hotchkiss, on the Voisin airplane. Guynemer, the French ace, used a similar cannon, firing through the propeller shaft of a Hisso engine, in a SPAD plane. It proved effective against aircraft and balloons. Leak-proof gasoline tanks and armor plate came too late—the war was over before much could be done about their practical application.

Records of these actions were shelved in War Department files until preparation for the current war brought them out again. Although aircraft were faster and more maneuverable when war came to the world in September, 1939, it caught American warplanes with their flaps down. Armament had not kept pace.

The few fighting planes that we had at that time were woefully lacking in needed firepower. Some of our fighter types had only one .30 caliber gun and one .50 caliber gun mounted side by side, firing through the propeller. These ships became obsolete overnight when World War II ushered in the era of the "flying gun platform." Yet, we had powerful bombers and speedy fighters "in the works."

Today, these ships and other aircraft of the Army Air Forces are carrying heavy firepower to the enemy.

Creating this sting, while adapting idea changes from the operational theatres, is the task for armament personnel of the Air Forces; more specifically, the job for the Materiel Command's Engineering Division Armament Laboratory at Wright Field.

War greatly accelerated the laboratory's job. Once a small, three-room office buried in the midst of hangars and shops at Wright Field, this laboratory was fed millions of dollars for experimental purposes and expanded into the largest aeronautical armament research center in the world.

In an effort to maintain superiority over enemy developments in firepower, our armament laboratory is continually working toward modernization or improvement of aircraft installations now being used in combat.

Aircraft fire control is a new art. This war's trend toward a battlefield in the stratosphere has spawned heretofore untried types of aircraft armament. One solution is the use of remote fire control systems which remove the gunner from the proximity of his guns, diminishing the effects of vibration on the sighting operation and allowing for greater comfort and less fatigue for the gunner.

Paralleling the development of these remote control systems, high priority is being given to heavier caliber guns and cannon for such installations.

Great advancement has been made in the application of heavy caliber cannon for fighter offensive use and as defensive installations in bombers. Much stress has been placed on power-driven turrets for all sizes of machine guns and cannon. Such installations include locally operated, remotely controlled and power-boosted hand-held mounts. The latter are vast improvements over original single hand-held flexible guns inasmuch as larger caliber, multiple weapons can be more accurately controlled and sighted free from slipstream effect encountered at high speeds. These installations and their continued improvement have done a great deal toward commanding respect from enemy fighters.

For example, just after Pearl Harbor, the Japs found B-17s without tail guns easy prey, and accounted for several of the bombers by rear attacks. Two .50 caliber guns were installed in the B-17 tail and on one particular flight (the first time the new guns were used in combat), the tail gunner of one Fortress shot down seven Jap fighter planes.

These early installations have been improved so that today tail gunners have more firepower and, in some cases, turrets have replaced the flexible guns. This increases effectiveness since turret fire is more accurate than the hand-held gun with its excessive vibration.

Machine guns fire from 600 to 1,200 rounds of ammunition per minute, depending upon the type of gun, caliber, temperature, synchronization and the design and location of all accessories such as feed chutes, ammo boxes and means of ejection. However, rate of fire must not be over-emphasized. Guns are rarely fired in long bursts. In air combat a pilot seldom holds his trigger for bursts that exceed 25 rounds. If fire duration is exceeded, guns will become overheated and unintentional firing, damaged barrels and other serious malfunctions will result.

What constitutes adequate firepower for modern aircraft frequently becomes the object of discussion among those not familiar with this all-important factor in air warfare. The mere presence of numbers of guns or cannon, irrespective of caliber, is not indicative of true firepower. Each airplane must of necessity be treated separately during its initial design when every conceivable consideration is given to the number of weapons, their caliber and, above all, their placement in the aircraft to assure maximum protection.

We have been fortunate in having a wide size range in aircraft weapons—from the small .30 caliber machine gun, capable of firing 1,200 rounds per minute and weighing less than 25 pounds, to the larger cannon which fires at a much slower rate. However, American firepower today is relying on the .50 caliber machine gun. It is the weapon most commonly employed in our aircraft.

This gun, hailed as the finest arm of its kind in the world, weighs approximately 65 pounds, and is capable of firing 800 rounds per minute. Relatively small in size, it fits easily into all of our aircraft types. The projectile leaving the muzzle at a speed of over 2,900 feet per second can penetrate any kind and all parts of an airplane. And the shell is small enough for as many as 1,000 rounds per gun to be carried. During one test the .50 caliber was fired at an obsolete bomber fuselage. It smashed the bomber's skin, ammunition boxes, a longeron, a hard pine board and then pierced a 7/16-inch piece of armor plate.

The .50 caliber gun has an effective range of four miles and from that distance still packs sufficient wallop to kill a man. Another measure of its force can be brought out when it is estimated that bullets from the eight guns on a Republic P-47 firing together deliver to an enemy target more horsepower punch than the 2,000 hp engine which pulls the ship through the air.

THE number of guns carried in an airplane depends largely on the airplane's configuration. In bomber types the guns usually are mounted in pairs which are disposed from nose to tail to afford protection from every conceivable direction of attack. In fighter types the number of guns varies from four to eight.

By comparison, a flight of thirteen Republic Thunderbolts, each with eight .50 caliber guns, has three times the striking power of a machine gun unit of a German infantry regiment. A formation of thirteen bombers, carrying a new heavy millimeter cannon now going on some of the medium types, carries twice the firepower of the 75 Howitzer used by the Nazi regiment. A single flight of thirteen Airacobras, carrying .37 mm cannon, is equal to the anti-tank guns of the regiment.

Downing an airplane with gun fire is not simple; it is difficult to keep a fast moving target in range. This means that

"We are designing guns and putting wings on them."

This small movie camera in the nose of a P-38 is used as an aid in improving firing accuracy. Visible in the photo above are three .50 caliber machine guns and one 20 mm cannon.

a gunner must fire more rounds in a given time interval to assure a hit on a speeding airplane. In one sense the perfection of the machinery provided the gunner can be considered a measure of his firepower. If each time the gunner squeezed the trigger he could be assured a hit, obviously one gun would be adequate. However, because of the complications involved—the ballistic behavior induced when a projectile is fired from an airplane, the human element, and the speed and maneuverability of the airplane target—aerial gunnery is a complicated procedure.

Our bombers for some time have been using computing sights which have forced enemy fighters to remain at a range from which their firepower is ineffective. These computing sights continually are being improved. The problems involved in correcting completely for aircraft gun-laying are many and, to obtain hits, they must be solved to a fine degree of accuracy. These solutions include accurate and instantaneous computation of and correction for lead and ballistic variations caused by altitude, range and speed of the firing airplanes. In fact, the corrections obtained through use of computers parallel those of the secret bombsight, but actually involve a greater number of factors which must be solved with even less assistance from the gunner.

In the last war the ordinary ring and bead sight was used as standard for all aircraft guns. Now the ring and bead sight is used only on hand-held guns. Reflector sights eliminate the need for lining up the gunner's eye and front and rear sights with the target since the sight itself actually projects a sight reticle image onto a transparent reflector plate which, at infinity, moves with the gunner's eye. Thus, although the gunner's head may be in continual movement in rough air, the sight line and target remain together.

Although the use of computing sights thus far has been limited to turrets, additional computing sights have been developed and placed in production for use in all other gun positions. A large amount of credit is due the various fire control system manufacturers for their research and development.

The gunsight aiming-point camera is proving highly beneficial in improving the accuracy of our gunners. A small compact camera, carrying 16 mm motion picture film in its magazine, is mounted

Below is a scene in the "torture chamber" of the armament lab at Wright Field, where gun barrels are tested to see how long they can take it. This man fires as many as 8,000 rounds of ammunition a day trying to "burn out" a gun.

behind the gunsight taking a picture of the sight reticle as it is projected on the target. Thus, it is possible to study exactly what the gunner has seen through the gunsight, and evaluations and corrections can be made to improve his aim. Quick-processing film enables this study to be made a few minutes after the gunnery practice—or actual air combat—since some of the cameras have already been employed in battle areas. While the gunner's errors are still fresh in his mind, he can see what should have been done to improve his effectiveness.

Recently, instructors at a gunnery school revealed that before using the gun camera their students scored 22.4 percent hits in ground gunnery and 4.7 percent hits in aerial gunnery, but after they had used the camera and studied their faults, the hit percentage was jumped to 27.5 percent for ground gunnery and 43.5 percent for aerial gunnery. Later, in trying for gunnery records, those trained on the gun camera scored 58.75 percent on ground gunnery and 59.5 percent for aerial gunnery. Thirty percent of gunners have been rated as experts after being trained in use of this camera.

Two main factors in aerial gunnery determine the accuracy of gun fire following automatic computation — *tracking* and *ranging*. Unless the gunner tracks smoothly and ranges precisely, the computing gunsight will be given inaccurate data on which to base its calculation. Tracking involves keeping the gunsight precisely on the target without deviation, while ranging refers to manipulation of the sight's range-measuring mechanism to keep the correct range constantly in the computer. Both are done in turrets by wrist or feet movements.

The pictorial record of the gunsight aiming camera enables the gunner to see his errors and to make corrections in succeeding trials.

Advancements in aircraft armament over the last four years have necessitated the development of new armament testing facilities including indoor and outdoor firing ranges, cold rooms for test firing at extremely frigid temperatures, high altitude pressure chambers, sight and computer testing devices and advanced electronic tests. Because our aircraft are fighting in extremely high desert temperatures and extremely low arctic temperatures, it has been necessary to design armament equipment for perfect operation in all climatic and atmospheric conditions. The temperatures under which armament items are tested range from minus 65 degrees to plus 160 degrees Fahrenheit. A recently completed cold test firing room at the Wright Field armament laboratory is proving invaluable in the investigation and testing of all equipment. In the high altitude pressurized chambers, strange phenomena of armament operation are being investigated continually.

From studies of the reaction of guns and their firing mechanisms to cold conditions, researchers have developed new greases and oils that allow smooth opera-

On this large armament range at Wright Field the forward and rearward fire of aircraft are tested. One of the A-20s shown here has been hoisted in the air to simulate a condition of flight in checking on the effects of vibration.

tion of guns at any temperature. They also have studied effects of cold and heat on the thick glass transparencies around windshields and turret installations and developed new types to offset the damaging temperatures.

In another section of the large laboratory is a "torture test" chamber where guns are fired on life tests. Mounted on a large grotesque frame, machine guns and cannon are fired for as many as 8,000 to 10,000 rounds a day to determine life expectancy of gun barrels and to make sure there is no malfunction in the gun mechanism.

Such tests produce innovations in gun design and installation methods. Armament engineers, with the splendid cooperation of Ordnance, have worked out the most efficient guns in existence. In one day this year, patent applications for seven new inventions on a particular gun were sent to Washington from the armament laboratory.

The normal procedure in the development of new items of armament equipment involves the following steps: Requirements are laid down—usually as a result of actual combat requirements which are forwarded to the Materiel Command—and preliminary specifications drawn up by the armament laboratory. These specifications in most cases are submitted to competent fire control manufacturers who conduct the necessary research development, design and fabrication of an experimental article, in collaboration with engineers at Wright Field. When the first article is completed, tests are made by the manufacturer prior to its release to the Materiel Command for further laboratory trials and installation in aircraft for preliminary air-firing. Upon satisfactory completion of this testing, the article is sent to the Army Air Forces Proving Ground Command at Eglin Field where complete functional and tactical suitability tests are carried out. If the article under test meets the requirements, it is recommended for standardization and procurement. This may seem a long drawn-out routine, but actually it is accomplished in a relatively short time, an example being the requirement for the computing sights for tail and nose positions necessitated by increasing losses of our planes from frontal and rear attacks by the enemy.

Oklahoma City Air Depot workers fasten the final bolts and screws in mounting a new stinger in the nose of a B-24. The glass front pieces are installed after the turret is tightened in place.

CONVERSION of the Douglas attack bomber into a night fighter was another example of meeting the demands from the front. For some time the British were using A-20s on intruder raids on the Continent—going over low, skirting between hills and dropping light fragmentation bombs on German airfields and gun installations in France. But this wasn't enough. The British wanted the plane for a fighter as well. They tried different types of gun installations in the nose of the ships. We have followed suit in converting the A-20.

Changes in armament usually mean long, drawn-out conferences behind closed doors—hard, cold fact discussions with experts from the equipment laboratory who tell us how much electrical energy we need for new installations, how much we can get and no more. Gun engineers, crack turret trouble shooters, bomb and bombsight technicians are present. We discuss the whole idea with the men who operate our training schools, teach our bombardiers and gunners. Then, from the aircraft laboratory specialists we learn how much airplane we can cut away for new installations; how much weight we can add here and take off there to keep the airplane aerodynamically stable. Some time is spent with production division men who handle the task of getting needed materials, readying a manufacturer to build the plane we desire and seeing to it that production begins immediately.

After standardization and procurement of new armament equipment, work is continued by the manufacturer and the armament laboratory to improve the article still further.

Indicating the scope of experimental projects concurrently undergoing development and testing by armament experts, there are at present approximately seventy airplanes of different types at Wright and Eglin Fields. In some cases, upon completion of the tests by Eglin Field, the airplane and experimental armament items are flown to a combat zone for further tactical evaluation before they go into actual service. All armament development projects do not originate with tactical organizations. The initiation of a new experimental airplane in most cases calls for a parallel development program on the part of the armament laboratory.

To illustrate how a new airplane may dictate new armament designs, it may be said that plans for the giant Douglas B-19 bomber called for unprecedented turret installations, before the British or any other country turned attention to the power-operated turret. The armament laboratory's task was *(Continued on page 56)*

THE MARAUDERS CAME THROUGH

B-26s leave the enemy coast after bombing a Nazi fighter base at Lille, France. Smoke is streaming from the right engine of one of the bombers as a result of flak damage, but the plane returned to base. Another B-26 is discernible near the left engine of the bomber at left.

By COL. SAMUEL E. ANDERSON

CO OF A MEDIUM BOMBARDMENT WING IN ENGLAND

ON a fine summer afternoon in July, a B-26 formation roared over the English Channel at 12,000 feet toward the railroad marshalling yards at Abbeville, France.

Above the formation hovered a watchful escort of RAF Spitfires, ready to nail the German fighters that already were rising from their bases to meet the attack.

Below the formation was the enemy coast—the hard-shelled rim of Western Europe that must be smashed for full-scale invasion.

And behind the formation were hundreds of hopes, plans and doubts that the Marauders would bomb the target and return—all of them—to base.

For this raid was an experiment. It was the first time that B-26s had been sent across the invasion front at medium altitude. They were traveling at a height within range of not only the heavy flak defenses but also the many light flak emplacements near the target area. They were flying into a territory dotted with Nazi fighter bases that protect the great German industrial areas.

I say there were doubts behind this experiment, because the first one had failed. That was a low-level attack by a B-26 formation two months earlier in which disastrous casualties were suffered. Regardless of the reasons for the failure of the first experiment, everyone from the pilots down to the last grease-marked mechanic waited in tense expectancy for the results of the new tactics against the Luftwaffe and the heavy German ground defenses.

There were some who even doubted whether the Marauder could operate successfully at any altitude, or under any conditions, in the European theatre. And that attitude was applicable to all types of medium bomber. The RAF had only a handful of Venturas, Bostons and Mitchells, alternately stabbing the Nazi defenses at both medium and low level. Maj. Gen. Ira C. Eaker, commanding the 8th Air Force, Brig. Gen. Robert C. Candee, commanding the 8th Air Support Command, and we of the medium bombardment wing did not agree with this attitude. Today's mission was our attempt to disprove all doubts.

Some questioned whether B-26s could operate successfully over Western Europe but this experimental raid dispelled all doubt.

Thus it was that there was considerably more than just the bombing results riding on this formation of B-26s as they opened their bomb bay doors over Abbeville.

We were back at home base an hour later—and we all returned safely. The Spits had taken care of the FW-190s and ME-109s that had attempted to intercept, and, while some of the planes suffered damage from flak, direct hits were avoided by evasive action. A few planes, though heavily damaged, came home without great difficulty. Since that mission, B-26s have come back with one engine shot out, with rudders almost shot off, with flaps and landing gear rendered inoperative — conclusive proof that the B-26 is a tough plane which can take a lot of punishment.

This mission — this experiment — had been highly successful, and as General Candee said after our return, "It's just the beginning of continuous operations to crush the German Air Force."

Within the next two months, taking time out only for extremely bad weather, the Marauders entered into a shuttle relay across the English Channel and North Sea that totaled sixty announced raids, an average of one a day. They flew more than 2,470 sorties with a loss of only

eleven aircraft, and dropped more than 2,800 tons of bombs.

Our objective has been two-fold: first, the destruction of the German fighter force in Western Europe, on the ground and in the air; secondly, the building of a battle-seasoned force to support our ground forces when they invade Europe. Although we rarely have caught the Hun on the ground, we have blasted the airdromes guarding German industry until photo reconnaissance has definitely established that many of the landing fields have been abandoned.

St. Omer, Poix, Tricqueville, Bernay St. Martin, Woensdrecht, Beaumont le Roger, Caen/Carpiquet, Lille/Nord, Lille/Vendeville, Bryas Sud, Merville, Amiens/Glisy—these Luftwaffe fighter bases have been under continuous attack, and the wearing-down process has shown good results.

ALTHOUGH we have given about 75 percent of our attention to German airdromes, marshalling yards and an occasional industrial target have been on our schedule, too. One of the best jobs of precision bombing ever recorded was the raid on the Le Trait shipyard August 4 when a fairly small formation of B-26s placed their bombs into a target 330 by 650 yards and almost completely destroyed it. Additional hits were scored on a submarine and a tanker in the slips.

The biggest day of operations came in coordination with the "amphibious exercises" held in the English Channel on September 9. That morning we threw our Sunday punch. Our targets were coastal defenses near Boulogne which contained heavy guns ranging up to sixteen-inchers. Every fifteen minutes for two hours the Marauders were hammering the gun positions, and the effectiveness of the saturation was apparent not only in the fact that the landing craft in the exercises were not fired on, but also in the Strike photos. One photo showed at least 42 bomb craters in one emplacement containing six guns.

Aside from the obvious conclusion as to what may be expected from the medium bombers supporting a possible invasion of Western Europe, that day offered a perfect example of what may be expected from the combat crews. One of our airdromes was shut in by weather that ordinarly would give pilots a restful morning in their bunks. It was a heavy ground fog about 400 feet thick, with 100-yard ground visibility. But the crews had learned during the briefing that an Allied fleet was approaching the French coast. Although they later learned that it was an "amphibious exercise," it seemed like the real thing at the time.

Up from this fog-bound field shot the Marauders, plowing through the murk until they broke out on top where they formed into boxes and went to Boulogne. In this extremely hazardous take-off only one bomber was lost.

The total for the morning of the "amphibious exercises" was 216 sorties. We lost three, in addition to the one on take-off, which was our heaviest loss on any one mission to date.

Because of magnificent support from RAF Spitfires, which have taken care of nearly all enemy fighters, a medium bomber's biggest worry over Western Europe has been the flak. It comes in big doses, but it isn't nearly as tough as the B-26s and the combat crews who fly through it. However, the proportion of bombers to escorting fighters has risen steadily. The same number of fighters which escorted the Marauders on their first medium altitude sortie now ordinarily escort many times that number.

Many of the 26s have limped back to base looking like a sieve, and I have lost count of the ones that have come home safely on only one engine. On one occasion, a B-26 piloted by Capt. Donald L. Weiss was badly crippled by flak before it reached the target. Instead of jettisoning his bombs, Captain Weiss decided to make his run over the target on one engine. Losing altitude, he had fallen out of formation, but he fulfilled his mission.

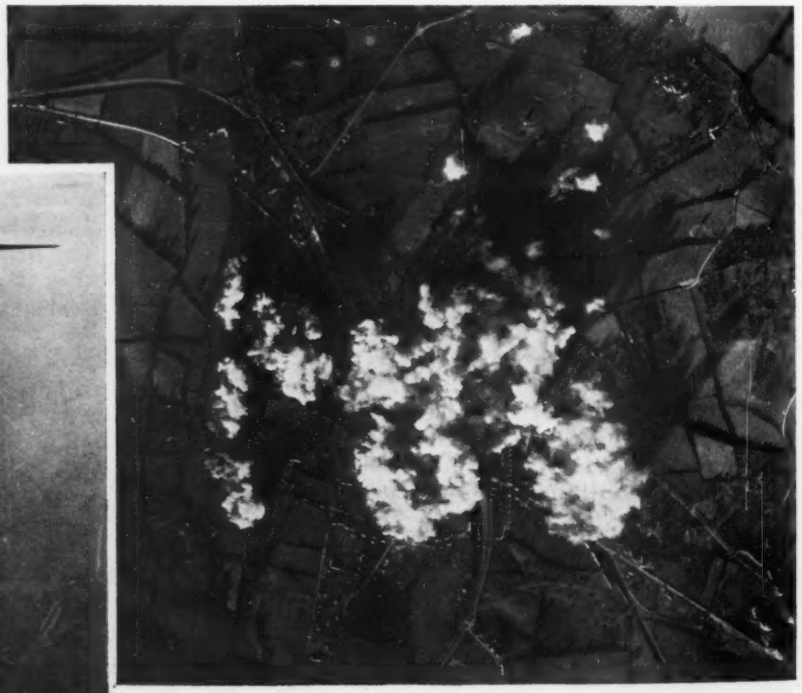
After putting his bombs on the target, Captain Weiss turned again toward England and took evasive action all the way out past the coast—still on one engine.

And there once was a time when people believed the B-26 could not fly on a single engine.

The Marauders raiding Western Europe have had just enough encounters with FW-190s and ME-109s to keep their twelve .50 caliber guns from getting rusty. The few enemy fighters that have slipped through the Spitfire screen have been given a hot reception. Claims against them over a two-month period are ten destroyed, four probables and eleven damaged.

Out of the extremely low loss record of the Marauders and the gradually apparent results of their precision bombing against Nazi airdromes, there has grown in the combat crews a spirit of quiet confidence in themselves and in the ability of their bombers to deliver the goods.

"I wouldn't want to take one home to use after the war as a family airplane," they admit. "But when it comes to combat, I'll take a Marauder every time. It's a hell of a fine fighting airplane." ☆



The B-26s below have blasted fuel dumps, barracks and aircraft shelters at the Merville airdrome, large German fighter base in Western France. Railroad marshalling yards (right) at Serqueux, France, are pounded by bombs dropped by B-26s.

WINGS FOR THE WOUNDED

By Lieut. Col. Richard L. Meiling
OFFICE OF THE AIR SURGEON

THE war had fallen on this Sicilian countryside like a sudden summer rain, then passed on until the battle seemed muted and far away. There was only the throb of a blunt, growing pain for the young American fighter pilot as he lay in a narrow ditch alongside a roadway.

As his mind cleared, the pilot's thoughts raced through the events which led up to his present plight—the enemy shell which had exploded his oxygen system and forced him to bail out, his parachute descent, the tricky wind current that threw him off balance just as he reached the ground, and the violent bump he felt as his leg buckled under him.

His leg was broken and the jagged bone had burst through the flesh. As he struggled to pull himself from the ditch, litter bearers of a medical unit arrived. The two enlisted men lifted him carefully to level ground, stopped the flow of blood and carried him a few hundred yards to a jeep.

Within an hour, the jeep had taken him to an advanced Army Air Forces base where he was placed aboard a C-47 of the Troop Carrier Command which had landed not long before with ammunition and supplies. With its crew had come a flight nurse and a Medical Corps sergeant to attend the evacuees on the return trip.

Other casualties of Sicily joined the wounded airman and, when the transport had taken on its load of patients, they took off for the African mainland. As the C-47 landed at a North African airdrome, a line of ambulances trailed out on the field and took the casualties aboard to move them to a base hospital.

After the injured pilot had undergone treatment for a week, hospital authorities decided he should be removed to the States. With a flight nurse in attendance, the airman and several other patients were flown in a C-54 to Miami and taken immediately to AAF Regional Station Hospital No. 1 at Coral Gables.

The fighter pilot smiled from his hospital bed as he recalled the days he had spent aboard an ocean transport getting to the theatre of operations and the forty-five hours it took to bring him home to the finest medical care.

The case of this American soldier is not unusual. Almost every day patients arrive in the United States aboard the planes of the Air Transport Command from all parts of the world where our soldiers are fighting. It is a gratifying sight to see these four-engine transports set down at a United States airbase and unload patients who had been evacuated from India and China less than eight days before, and to know they will receive at once the highly specialized medical care that is possible in a modern hospital. It is heartening assurance to any man in the armed service to know that should he become a casualty he can be brought home in a seven or eight-day air voyage rather than experience two months of tiring passage in an ocean convoy.

Maj. Gen. David N. W. Grant, The Air Surgeon, has directed the development of the service which the Army Air Forces have used since Pearl Harbor to evacuate more than 100,000 casualties in every theatre of operations and along every route of the Air Transport Command. Through the air evacuation service, built by General Grant's organization, the lives of many fighting men have been saved. In the Mediterranean theatre alone, as of October 1, more than 25,000 casualties had been flown to base hospitals from the battlefields of Tunisia, Sicily and Italy without accident and with only one death enroute—a tribute to the Troop Carrier Command pilots and crews.

The growth of our Air Evacuation Service which has moved more than 100,000 battle casualties since Pearl Harbor.

CONSIDER very briefly the military logistics as they are influenced by the use of an organized air evacuation service. It has been estimated that it takes eight and a half tons of supplies initially to maintain one man overseas for the first thirty days, and one and a half tons each month thereafter. The personnel of a 750-bed hospital number 539. Add to this the 750 patients, and multiply the above figures in tons per month, and you can see why the staff officers worry about logistics on the non-effectives. Consider, too, the problem that confronts staff officers in the actual fighting zones. There the roads are limited in number and capacity, and rail lines are either non-existent or consist of a single temporary track. Hospital trains and surface ambulances marked with the Geneva Red Cross can be used only to transport patients. The fuel, gasoline and oil required by these vehicles must be moved forward to their areas of operation, and since these single purpose vehicles invariably move in the opposite direction to the flow of traffic within the fighting zone, traffic is snarled and the roads and railroad sidings become congested. Air evacuation is the answer to the worried staff officer's prayer. Using the same camouflaged planes that bring troops, supplies and equipment forward (and which, were it not for evacuation, would return empty), and employing cover of a fighter escort when necessary, casualties can be flown hundreds of miles to the rear of the fighting zone. In this manner, hospitals to which patients are evacuated present a minimum of supply and traffic problems to combat commanders.

The more patients who require prolonged hospitalization or rehabilitation that are flown back to the States, the fewer medical facilities are needed and the smaller is the number of ship-tons of supplies required in the theatres of operations to support these non-effectives.

In Africa, Alaska, New Guinea and Sicily, AAF transport planes have been called upon to move entire field hospitals hundreds of miles. In one instance, ten planes were used, and in another forty planes. The remarkable part of this movement is that the hospitals were able to receive patients in their new locations on the day they were flown forward.

In May, 1942, the first airplane ambulance battalion was organized at Fort Benning, Ga., and on Oct. 6, 1942, it was transferred to Bowman Field, Ky., and redesignated as an Air Evacuation Group. The following month further reorganization was effected and the Medical Air Evacuation Transport Squadrons made their debut. On Christmas Day, 1942, the first of these squadrons left Bowman Field for the North African front, were soon followed by other squadrons into the other battle zones, and today they are serving wherever American troops are fighting and along the ATC's world routes.

A brief explanation of the operation methods of these Medical Air Evacuation Transport Squadrons is required to portray the extensive job they are doing. The headquarters and headquarters section has one flight surgeon (the commanding officer), one flight nurse (the chief nurse) and one administrative officer (supply, motor and mess officer), and 32

enlisted men who are clerks, cooks and drivers. There are four flights, each commanded by a flight surgeon, and composed, in addition to the commanding officer, of six nurses, six surgical technicians and two clerks. Each flight is divided into six evacuation teams, and each team is composed of one flight nurse and one staff sergeant.

OPERATING with flexibility to meet the immediate problem, the usual method of air evacuation within a fighting zone is to send the commanding officer (flight surgeon) of one flight forward to the airfield from which patients are to be evacuated. There he coordinates with the ground medical installations to learn the number of patients requiring evacuation, maintaining at all times liaison with the flight operations officer of the airfield. In this way he is able to arrange for patients to arrive at the airfield at the time the evacuating plane is available for movement. It is highly desirable that the patients do not arrive at the airfield before the plane is ready to take on patients. The actual loading of casualties is accomplished by the air evacuation medical personnel in a matter of minutes. The same coordination is accomplished at the airbase in the rear areas, the ambulances being ready to move the patients to hospital immediately upon arrival of the plane.

Aboard these cargo or transport planes of the AAF, litter supports are available. Frequently they consist of metal racks, in which case, the C-47, for example, can carry eighteen patients. On other occasions, parachute webbing straps are used, in which event the same C-47 can carry 24 litter patients. Naturally, it is not desirable always to carry only litter cases; hence it is possible to mix litter and sitting or walking cases by using the "bucket seats" used by paratroops and other airborne troops on flights to the forward areas.

The evacuation team (one flight nurse and one staff sergeant) is aboard the plane flying supplies, materiel, equipment and personnel to the forward areas. They convert the ship to receive patients, and supervise their loading. When circumstances require it, they actually load the patients. The flight surgeon at the forward airbase keeps a complete record of all patients being evacuated, and the flight nurse aboard the plane makes a complete record for each patient, including the diagnosis, time in the air, altitude at which flown and the treatment required. Each evacuation team has available aboard the plane a "Chest, Airplane, Ambulance." This is a medical chest containing necessary equipment such as heating pads, bedpans, syringes, as well as the medicaments, blood plasma and food required enroute. In some cases the flight surgeon may accompany the flight, while in others the flight nurse may be alone on one plane and the staff sergeant alone on another. This occurs only when the number of patients to be evacuated necessitates the separation.

Aboard a flying ambulance in the South Pacific, a flight surgeon and a flight nurse administer a blood transfusion to a wounded soldier being evacuated.

Personnel of the Medical Air Evacuation Transport Squadrons are carefully selected for their training in the AAF School of Air Evacuation at Bowman Field. It is truly a case of "many are called, but few are chosen." The applicant must pass the physical examination required of all flying personnel, and he must be recommended by the senior flight surgeon as being particularly adapted for air evacuation work. From this select group, an exceedingly small number enters the school every two months. Upon arrival at Bowman, they again are carefully examined by flight surgeons. The course of instruction for flight surgeons, flight nurses and staff sergeants is difficult and strenuous. It includes particular phases of aerial medicine, aeronautics, tropical medicine, intravenous therapy, field sanitation, field service, compass, map and aerial photography orientation, defense against air and gas attacks and many other military and medical subjects. Graduates are assigned either to a newly activated Air Evacuation Medical Transport Squadron or to an AAF hospital for duty while awaiting activation of a new unit or assignment as replacement for personnel already serving overseas with air evacuation units.

In New Guinea, air evacuation began in August, 1942, and during the first 72 days of this service, more than 13,000 patients were flown across the Owen Stanley mountains. During last December alone, more than 7,000 patients were evacuated in New Guinea. A considerable number were flown to Australia. In the New Caledonia-Guadalcanal area, Army Air Forces, Navy and Marine Corps transport planes worked under a single command. Here evacuation of casualties began on September 3, 1942 and more than 17,000 patients have been flown out. In the North African Tunisian campaign which terminated May 23, 1943, the AAF evacuated more than 18,000 American, British, French and prisoners of war. During the Sicilian campaign, the Northwest African Air Forces (American and British) evacuated more than 14,000 patients by air. The 11th Air Force in the Alaskan area has evacuated over 1,000 patients by air this year. In the Libyan campaign, the 9th Air Force, supporting the British Eighth Army, evacuated by air more than 3,000 casualties during November and December of 1942. In the China-Burma-India theatre, our fighting forces are dependent upon air evacuation entirely. The transportation problem—

A battle casualty in New Guinea is placed aboard a plane which a few minutes before had unloaded equipment and supplies at a forward airbase.

the lack of roads and railroads—has made it inevitable that air evacuation play an important role in providing the high type of medical service that the American soldier deserves.

Yet, despite these accomplishments, early work in the field of air evacuation was not unopposed. Many staff studies, suggesting that air ambulances were impractical in war zones, pointed definitely to the medical dangers to be encountered in the transportation of patients by air.

Prior to 1940, in both American medical journals and those of foreign countries, many articles appeared concerning the types of patients that might be flown and the types that should not be flown under any circumstances. Experience has shown, however, that a detailed understanding of the physiology of flight and of aviation medicine as a whole is far more valuable than all the theoretical articles previously prepared. Medical personnel who have received adequate instruction in the care of patients while in flight have enabled the Army Air Forces to fly all types of patients without endangering their lives to the degree that travel by surface craft might have done.

The German Luftwaffe, in its "dress rehearsal" for World War II, held under the guise of aid to the Franco supporters in the Spanish civil war, evacuated casualties of the German Condor Legion by air over the Alps to German university and military hospitals. These flights of 1,500 miles were accomplished in ten to twelve hours, as compared to the many days required by boat. The patients were taken to altitudes ranging from 15,000 to 19,000 feet, thus making medical history in that for the first time records of actual transportation of battle casualties at such altitudes were available.

In September, 1939, the Luftwaffe, supporting the blitzkrieg as it rolled through Poland, evacuated approximately 2,500 patients from the Polish battlefields to the hospitals of Germany. According to German press reports of August 9, 1941, some 280,000 casualties had been evacuated by air from the eastern front in the Balkans and Russia.

Few details are known as to the operation of air evacuation by our Russian allies. It is reasonable to assume, however, that they use air evacuation extensively, because of the vast distances involved in their battle lines. The British, Canadians, Australians, and French in most instances have used air evacuation facilities provided by the combined Allied Air Forces in the theatres of operations.

DURING the first World War, both the Allies and the Central Powers used combat planes to transport wounded personnel. At best, these were far from satisfactory since the patient was of necessity wedged into the narrow cockpit of the open planes. However, in France a young physician—a Dr. Chassning—who was likewise a great aviation enthusiast, invented what is thought to have been the first airplane ambulance. In 1917, Dr. Chassning, who represented the District of Puy-de-Dome in the French Chamber of Deputies, made his plea before that legislative body for an appropriation of funds to finance the development of his airplane ambulance. His plea was met with prompt and cruel criticism, one opponent demanding to know: "Are there not enough dead in France today without killing the wounded in airplanes?" But Dr. Chassning was persevering, and by the fall of 1917 he had secured the necessary funds and built his first military airplane ambulance. In the first flight at Villa Coublay in September, 1917, the doctor served as the first patient. His plane was used later on the Amiens front.

A few months later in the United States Maj. Wilson E. Driver, a reserve medical officer assigned to the Army Air Corps, enlisted the aid of Capt. William C. Ocker of the Air Corps, and they developed what is now recognized as the first American ambulance plane. It was plane No. 3131, placed in service at Gerstner Field, Lake Charles, La., in February, 1918. The rear cockpit of this plane—a converted *(Continued on Page 53)*

At an advanced base in North Africa, Medical Corps personnel prepare to remove wounded from an ambulance to a transport plane which will take them to well-equipped hospitals hundreds of miles from the battle front.

PREPARE FOR INSPECTION

ADMINISTRATIVE • COMMUNICATION • TACTICAL • TECHNICAL

TIMELY ADVICE FROM THE AIR INSPECTOR

Matters presented here are informative only, and are not to be considered as directives.

TIPS FOR THE UNIT REPRESENTATIVE AT A PORT: If you are ever assigned as a Port of Embarkation representative of an organization going overseas, the information below should be helpful to you. These tips were picked up by POM members of the San Francisco field office of The Air Inspector on a visit to a port:

Have several copies of shortage lists to avoid scurrying around for a typist to turn out additional ones.

Bring along a portable typewriter if possible.

Check with the various supply agencies at the port, even though the shortage lists are negative.

Be sure you understand everything in the movement order.

Don't forget to find out from your organization commander in what priority he desires to load his special and general purpose vehicles and organizational equipment, so that they will be in proper order for unloading at the debarkation point.

Keep in touch with your organization commander and inform him of any changes or deviations from planned procedure.

Don't forget to look at the port bulletin board for instructions, and check the message center frequently.

Keep informed on the status of your unit's property.

Be sure that when initial shortage lists are submitted, an entry is made thereon which will clearly cancel any previous requisitions.

Remember that the following medical supplies are automatic issue: sulfa drugs, foot powder, adhesive tape and first aid kits.

Remember, too, that cleaning and preserving materials for individual weapons during the voyage are a matter of issue by the ordnance supply agency at the port.

FAREWELL TO ARMS — UNNECESSARILY SORE: Unnecessary "repeat performances" of immunizations should become a thing of the past through careful adherence to the provisions of AAF Memo. 35-2.

This memorandum directs that an original and duplicate copy of the Immunization Register will be made in all cases. Whenever an immunization roster is furnished by a station hospital to an organization, original copies of Form 81 for individuals immunized will be attached. Immunization data will be recorded immediately in the Service Record upon receipt of the original copies of Form 81, and these copies will then be attached to the Forms 28 (Individual Pay Records) of the enlisted men.

If the original copy of the Form 81 is lost, a true copy, signed by a commissioned officer, will be furnished the enlisted man. Information will be obtained from the Service Record or from the copy retained by the station hospital.

In case a soldier becomes separated from his Service Record, his organization commander will accept the evidence of the original immunization register in the possession of the man, pending the receipt of his Service Record.

TELL THEM MEN ARE COMING: Unexpected guests can be just as disturbing in the Army as in civilian life. It is not intended that enlisted men should arrive at a station with no provision made for food and quarters. Commanding officers and transportation officers are reminded of the provisions of WD Cir. 102, 1943, Par. 3b (1):

"The station commander (transportation officer) at the point of origin of each movement will inform the station commander (transportation officer) at destination by telephone or telegraph (not radio) of the unit designation, strength, date of departure, and expected date and hour of arrival of each element. This notification will be given for all movements of units and detachments and will be made in sufficient time to permit proper arrangements to be made at new station for the reception of the troops."

REALISM IN FIRST AID TRAINING: Making first aid training as realistic as possible is a problem for instructors in this country. It is no problem overseas, as the men's interest increases in proportion to their nearness to combat. When a gunner is taken from a bomber with a bullet in his arm, and the medical officer says his life was probably saved because a crew member applied a simple tourniquet promptly, every man on the station is convinced of the value of first aid training.

You can't shoot a man in the training phases to demonstrate the practicability of first aid, but you can produce some "reasonable facsimiles" of the real thing. Some bases have staged sham battles as part of the first aid classes, and the realism obtained in caring for the "wounded" was most effective.

RATIONS ON TROOP TRAINS: Base administrative inspectors can be of real service to officers appointed as train commanders, quartermasters or mess officers in the movement of troops by rail. Inspectors should contact the train officers, especially if they are inexperienced junior officers, and go over WD Cir. 100, 1943, with them. No officer should be in charge of troops on a train unless he thoroughly understands the use of rations and ration funds. (AAF Memo. 67-17)

FROM THE MEN WHO KNOW: Draw up a chair, crew members, for those "bull sessions" with colleagues returned from overseas. Tactical inspectors are urging

trainees to listen carefully when combat veterans start relating their experiences. Reports from overseas reveal that many bombers have shaken off all the flak the enemy could turn loose because of pointers the crew members picked up by listening to men who had been in action before them.

LIFE RAFT HAZARDS: "There's a life raft out in my north pasture. It came floating down from the sky and darn near scared my cows to death."

The South Dakota farmer telephoning this information to an airbase was reporting something which you technical inspectors in the field should strive to prevent by spot-checking bomber life raft compartments.

Packing too much equipment in the compartments or placing wrong size rafts in them may cause the spring locks to give way from strain. The resultant damage may be much more serious than a few frightened cows. The dropping of the rafts into the air stream is liable to cause a smashed tail surface and a fatal crash.

'BURY' YOUR HELMET LINER: Just imagine, soldier, that your helmet liner is the last one you will get for the duration and take care of it accordingly. As a matter of fact, you may find yourself in a spot overseas where it is impossible to get another liner, and uneasy will lie the head that wears a cracked one.

Particular care should be taken in stowing the liner in your barracks bag. Ordinarily, in troop movements the liner is worn, but if it isn't, be sure to surround it with clothing. (WD AGO Memo. W600-71-43)

CHECK SPARE PART SPECIFICATION: Crew chiefs, carefully compare the specification number of a new part with the number of the part it is to replace in a plane. There may be trouble in the sky if you don't.

The fuel line is an example of the many items the specification numbers of which should be checked. The wrong line may not be strong enough to withstand a strain of high altitude and may collapse, causing fuel stoppage.

CRACKS IN TURRET DOMES: Reports from combat theatres indicate that under the rigors of extreme heat turret domes of plastic construction may develop cracks. These cracks, due to expansion and contraction, usually are first noticeable around the base of the dome. Frequent inspections should be made to discover these cracks and renew the dome before the cracks become large. If cracks are neglected, buffeting of the wind will finally cause a complete dome failure, and, when the dome rips off the turret, severe injury may be caused to the turret gunner.

☆ INSPECTING THE INSPECTOR

Are you delaying thorough inspections of organizations until they are alerted? They need this help on details throughout their entire training period.

☆ ☆ ☆

Are you checking to see that additional items are entered on Form 20 (Soldier's Qualification Card) as prescribed in Par. 3, AAF Reg. 15-126, 2 August 1943?

☆ ☆ ☆

Are you following through on inspections of organization sets of regulations and directives to be sure that requisitions are submitted for needed publications?

☆ ☆ ☆

Are you checking to see if the "Spartan simplicity" policy is being followed in post construction? Only the most urgently needed painting and repainting will be permitted. (WD AGO Memo. W345-23-43, 24 August 1943)

☆ ☆ ☆

Have you inspected bulletin boards recently to be sure they are not cluttered up with obsolete matter?

LIGHTS OUT: Burning midnight oil is all right at midnight, if necessary, but it is certainly not necessary at high noon. Administrative inspectors should make frequent checks to see that lights are not left burning needlessly during the day. Doorway lights of barracks and other buildings especially should be checked. ☆

☆ HERE ARE THE ANSWERS

Q. Where do you obtain Standard Form 1055, used in claiming arrears of pay for deceased personnel?

A. This form will be furnished the proper claimants by the Finance Officer, U. S. Army, Washington 25, D. C. (Ch. 1, AR 600-550)

Q. May liaison pilots fly planes of more than 180 horsepower?

A. Yes. Liaison pilots are now restricted to liaison type aircraft of 190 horsepower, instead of 180. (AAF Reg. 35-27, 17 August 1943)

☆ ☆ ☆

Q. Is information as to name and address of emergency addressee still required on identification tags?

A. No. (Ch. 25, AR 600-35) No effort should be made, however, to revise identification tags now in the hands of individuals.

☆ ☆ ☆

Q. How often must military personnel be revaccinated for typhoid fever and paratyphoid fevers?

A. Annually. (Ch. 6, AR 40-210)

☆ ☆ ☆

Q. If movement orders for overseas specify yellow fever vaccination, should the vaccination be delayed until arrival of individuals at the staging area or port of embarkation?

A. No. Such vaccination will be accomplished at the station of final phase training immediately upon receipt of movement orders. (Letter, Hdqts. AAF, 10 September 1943, AAF 062.2)

☆ ☆ ☆

Q. If trunk lockers are not available for officers going overseas, may box lockers be requisitioned as substitutes?

A. Yes. (WD Cir. 196, 1943)

☆ ☆ ☆

Q. If a disbursing officer fails to take advantage of discounts for the payment of bills within a certain time, must he justify his failure?

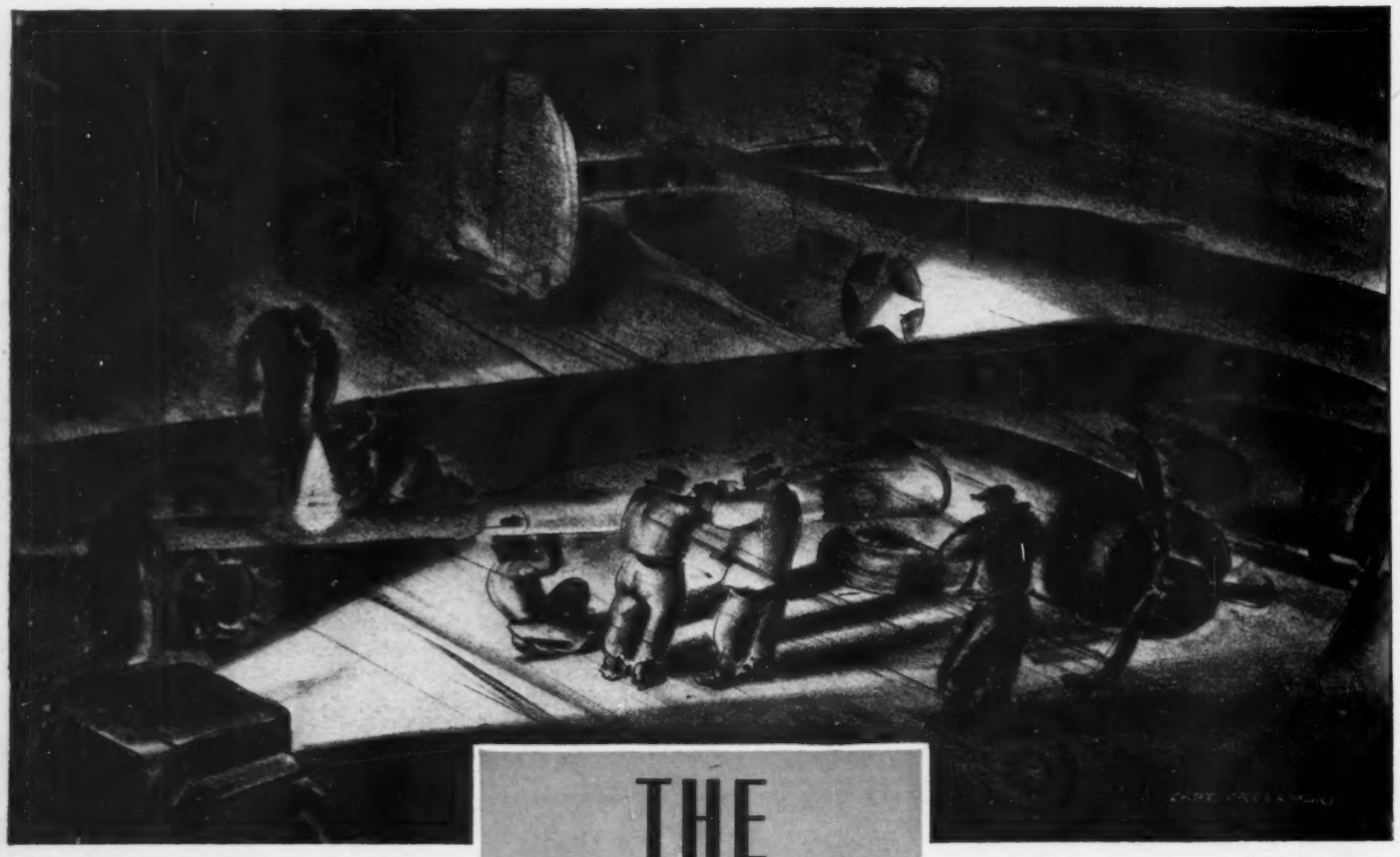
A. No. He will take advantage of all discount features, if possible, but there is no obligation upon him to justify failure or to obtain waivers for failure to take advantage of discounts in those cases where payment is made after the expiration of the discount period. (Ch. 1, AR 35-6200)

Q. When is a per diem allowance authorized instead of a mileage allowance for travel?

A. Per diem is authorized in connection with travel only when it is considered that the length of temporary duty may result in expenses that will exceed the reimbursement on a mileage basis and thus cause the traveler to suffer a loss. In all other cases payment of a mileage allowance is the normal form of reimbursement for ordinary travel in a mileage status. (Ch. 1, AR 35-4820)

ON THE COMBAT LINE

AIR SERVICE COMMAND REPORTS FROM THEATRES OF OPERATIONS



THE RAMBLING WRECK

Illustrated by CAPT. RAYMOND CREEKMORE

THEY thought "Jap Picnic" was through with flying that afternoon in September, 1942, when she was reduced to a mass of tangled wreckage in a taxiing collision on bleak Aggatu Island in the Aleutians. But with that wreck began the most interesting chapter in the career of the battle-scarred B-24.

An engineering officer, Capt. Doug Symington, put Jap Picnic back in the air, piece by piece. Here's how it was done:

Two months after the field collision, a bomber limped into Aggatu from a mission over Kiska with the leading edge of a main wing spar shot up and a de-icer boot badly damaged. There were no parts in stock so Master Sgt. R. M. Brosius, line chief, put his men to work on the carcass of Jap Picnic. With eight men, including Gilbert Hansen, civilian representative of Consolidated Aircraft, they braved a 35-knot gale through an entire night removing hundreds of little screws to dismantle the damaged spar, boot and de-icer from the damaged plane and from the "wreck." They then fitted the specialized bones of old Jap Picnic into the wounded bomber. They worked by the uncertain rays of flash lights and jeep headlights without any shelter from the storm.

Only two fragile 3/16th drills were between the crew and failure and one of them shattered as the second hole was drilled. The remaining drill had to last and did. After each drilling it was resharpened on a hand grinder clamped to the fender of a jeep. The tedious job required ten hours and at 0500 she was ready to fly a combat mission.

Two weeks later another B-24 returned from a Kiska mission with one prop feathered and an engine frozen stiff. Replacements were not in stock. The ground crew pounced on the remains of old Jap Picnic, wrestled an engine from its nacelle and substituted it in the crippled plane. This job was done in less than 19 hours through a 45-knot gale that whipped sleet and snow about in below-freezing temperature. Tarpaulins partially protected the men from the sleet that bit like steel. Crew chief stands and workmen were hurled to the ground by the frigid blasts; the plane was lashed to a tractor and a jeep to hold it on the ground. With tools meant for second echelon maintenance, the crew completed the job in time for ship No. 1816 to fly a combat mission the next afternoon. Another hunk of Jap Picnic was in the air again.

Ship No. 1091 came in with all the wires from the bombardier's compartment to the bomb rack burned out—more than 100 wires servicing 20 stations. The ground crew snipped the wires from Jap Picnic's insides and spliced them end to end in the nerveless ship. There were 150 wires and each had two

joints to be soldered, taped and shellacked. Only one man at a time could carry on the job because of the shortage of tools and the cramped quarters. Lying on his back, he would work with his arms outstretched until his muscles became cramped. Then another man would take his place.

It took fifteen hours of this exhausting work before 1091 was back in service, but she passed inspection for third echelon maintenance.

Old Jap Picnic someday will be bombing Tokyo. She can't miss for she has turrets, a nose section, her rudder, a wing tip, flaps, radio, ignition parts, a prop governor, trim tabs and other odds and ends in almost every heavy bomber flying for the 11th Air Force. And, to make sure that none of her parts are wasted, Maj. Robert Orth acquired her cockpit carpet for his quarters. Despite her loyal military service, she also had to serve as a privy for a time. A seat was wrenched out of her to make an open air toilet.

INVENTORS IN NORTH AFRICA

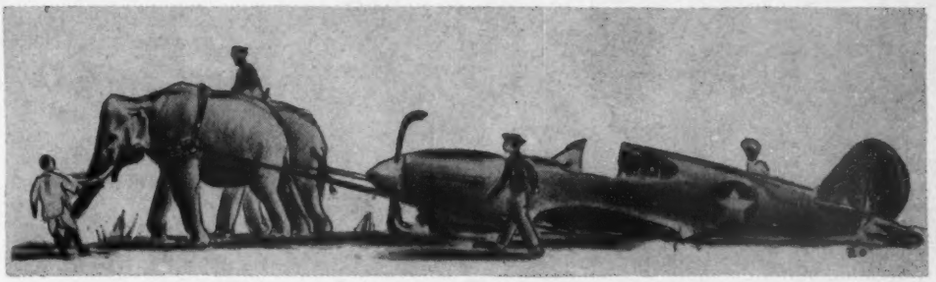
AMERICAN boys who made their jalopies run with bent nails and bailing wire have taken their resourcefulness with them to North Africa. A staff sergeant with the 12th Air Force has used salvaged parts to devise a testing board for almost every instrument on the B-17 control panel and has made a generator testing device from a gun turret mechanism. With odds and ends, he has built an inter-communication system for his camp in Africa. For the medics on the base, the mechs have made a sterilizer. As in most GI inventions, the basic parts came from that highly adaptable item — the 55-gallon drum.

A MAINTENANCE TIME-SAVER

STAFF SGT. ROBERT HAMMEL gets restless when he sees work being performed tediously by hand. A mechanic at an advanced depot of the 8th Air Force Service Command, he concluded that a lot of man hours were being wasted in polishing the booster coil points of a bomber engine. By fashioning a three-piece tool and fitting it to a drill press with an electric motor hook-up, he developed a first-class polisher that saves one hour and twenty minutes on each set of points.

THE MEN BEHIND THE GUNNERS

AT another 8th Air Force Service Command air depot, Staff Sgt. Russell Schlick helped the gunners in his outfit knock down an extra Jerry or two by developing an adjustable sight for long-range shooting. His invention, an adjustable ring and post sight for certain guns, now enables gunners to adjust their sights for almost any target distance within the effective range of their guns.



RECLAIMING A WRECKED P-40 FROM THE BURMA JUNGLE

A FEW days after Christmas in 1942, Lieut. Allen Whittington, engineering officer, received word that a P-40 had crashed on a river island 100 miles from his base in the Assam-Burma combat area. His job was to take his salvage crew to the jungle island, reclaim the plane, return it without further damage and rebuilt it in a minimum of time.

Lieutenant Whittington chose as his salvage crew Tech. Sgt. Herbert Kraling, Staff Sgt. Ronald McDonnell, Cpl. Hucle Truly, Cpl. Lewis Beezely, Cpl. Leo Park and Pvt. Thomas Cobb.

With ten-day rations and tools and equipment for dismantling the plane, the salvage crew piled into a DC-3 in the afternoon. The wreck was spotted from the air about fifty yards from the river bank. The pilot set the transport down in a nearby grass field and the salvage crew unloaded and prepared for action.

The P-40 pilot had escaped unhurt and had obtained two elephants to tug the wreck through the jungle to the river bank where it could be loaded on a barge. The day after reaching the island, Lieut. Alfred Wipf, fighter squadron engineering officer, Lieutenant Whittington and Sergeant Kraling negotiated a trail to the river's edge about thirty miles upstream. Without great difficulty, they were able to rent a rice barge from a native Indian for 300 rupees (about $100) with a bonus if he would hurry. The barge was nine feet wide and sixty feet long.

The native agreed to take his barge down-river to the spot near the wrecked plane, so Lieutenant Whittington returned to the camp of his salvage crew where plans were made for disassembling and transporting the P-40 to the barge on the river bank.

On the fifth day the salvage crew succeeded in getting all equipment to the plane where a tent was set up for quarters. Tail sections and engine were removed, and the engine was put on a shipping stand that had been brought along. A contract with the village chief produced a bamboo ramp from shore to boat.

Two days later, after all plane parts and salvage equipment had been loaded, the crew broke camp and began poling the boat down the river.

On the tenth day the salvage party reached a point on the river where Lieutenant Whittington, who had returned to base to make further arrangements, was to meet them with trucks.

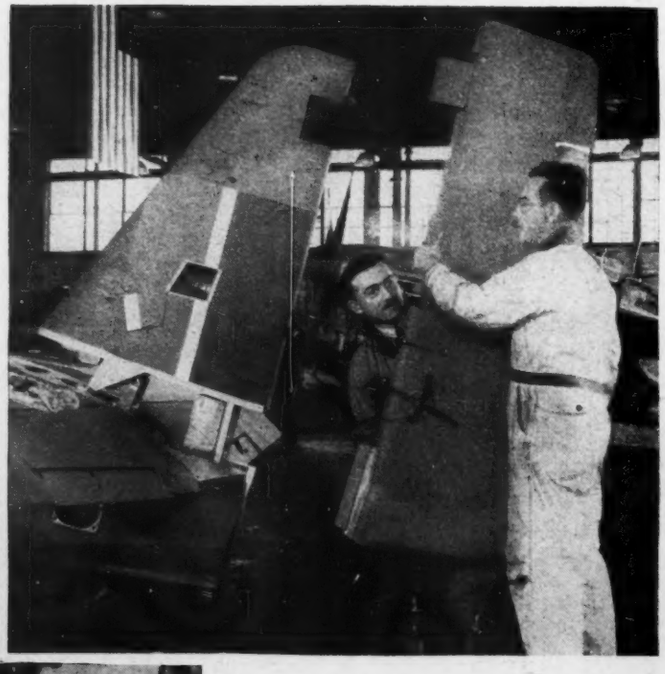
Lieutenant Whittington, meanwhile, had mapped a road from the base to the barge landing spot. This job required more than 200 miles of driving over jungle paths and wagon trails in a jeep to find a passable truck route. A trailer then was built from a truck chassis by Tech. Sgt. James Quinn, Staff Sgt. Theodore Dorn and Cpl. Harold Busch.

At 0100 the following day, the truck detail reached the barge detail. Dense fog hindered the loading but the job was accomplished. The P-40 arrived at the base on January 9, fourteen days after the plane had crashed and twelve days after orders had been received to reclaim it.

The salvage detail of the service squadron had travelled 100 miles by air, 150 by boat and more than 150 by truck. Rebuilding the plane for combat service came easy. ☆

PRELUDE

Like the shadow and shape of flights to come, these planes await against the clouds for shipment overseas. They have just arrived by "flyaway delivery" from plants all over the nation. In these shakedown flights they have revealed any faults for correction before they fly against the enemy.



From the "staging area" the planes are towed into hangars where dozens of workmen swarm over them to remove the propellers, tail assembly and wing tips. Each seam is taped water tight. They tape every outlet and vent, install dehydrator plugs, drain the oil and hood the engine with heavy tarpaulin. Every conceivable thing is done to protect the plane from damage on its ocean voyage on the deck of a ship.

Accompanying each plane on the ocean crossing is its individual packing case carrying the propeller, wing tips and other parts which may be reassembled overseas to place the plane in readiness for combat.

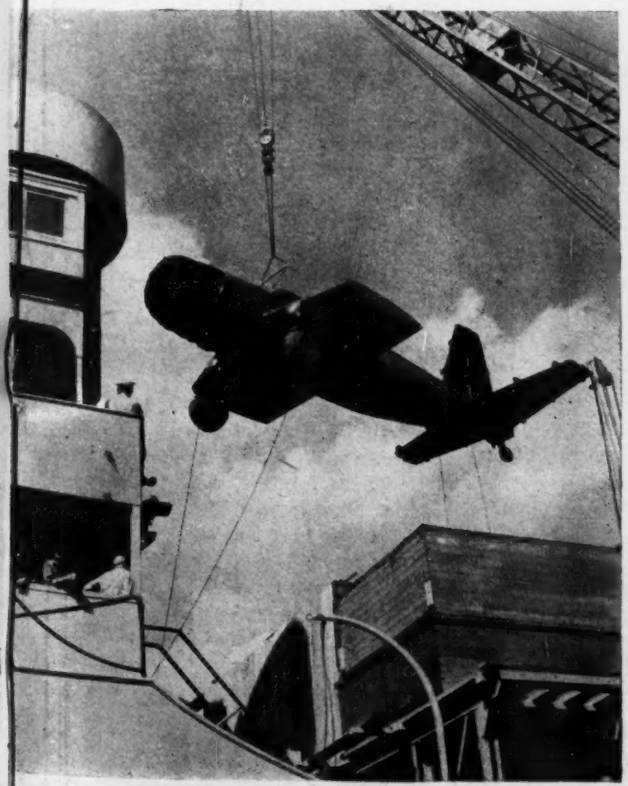
TO COMBAT

THE Atlantic Overseas Air Service Command has a goal of empty warehouses. Warplanes by the thousands are flown into the command area at Newark and prepared for delivery to our fighters overseas. Any disruption in this gigantic torrent of war materiel can cause the warehouses to bulge. It is the job of thousands of officers, enlisted men and civilian workers to expedite the flow of AAF and air lend-lease materiel through Atlantic and Gulf Coast ports to overseas theatres of operations. There is little glamour in crates and boxes, but they go to the men who win the medals. AOASC workers, one officer explained, are the embodiment of people who stand in reflected glory. "Our morale rides like a kite on the tail of a fighter plane," he said. ☆

Waiting like trussed birds, these planes are ready to be loaded on the decks of oil tankers, merchant vessels or warships. Almost everything that floats is used to carry a complement of fighter planes across the seas. The aircraft above are now completely taped and sprayed with an oil coating to protect them from salt water and spray.

Close-ordered as infantrymen, these P-47s stand on the deck of a small aircraft carrier to be taken to a theatre of operations. The Atlantic Overseas Air Service Command, the AAF's greatest shipping outlet, is keeping the warehouses empty.

The ocean voyage begins when the great hydraulic cranes lift the planes from the dockside and swing them to the deck of a ship. Each plane has its individual packing case carrying the disassembled parts.



PREPARE FOR DITCHING

The following summary of ditching procedures was prepared by the Office of Flying Safety in cooperation with Bombardment Department, AAF School of Applied Tactics. —THE EDITOR.

THE pilot and crew of a B-17 returning from a raid on Wilhelmshaven early last spring ditched their ship in the face of almost incredible odds.

The bomber dropped out of a formation over the English Channel shortly after leaving the continent. Two of its engines were shot out and a third was operating improperly. A pack of Focke-Wulfs pounced on the crippled plane for a kill, and as the pilot reported later:

"The situation looked completely hopeless."

With one good engine, the pilot managed to keep up an evasive action while his crew played a stream of lead into the attackers. The ship's tail, now almost chewed in two by enemy fire, started blazing. The right waist gunner succeeded in smothering the fire, only to have another crop up in No. 2 engine. The co-pilot managed to extinguish this one.

Between 7,000 and 8,000 feet, the pilot decided that ditching was inevitable, so he immediately issued the preparatory order.

All but two of the enemy fighters had been left behind. The Fortress was out of ammunition, except for the top turret guns. Realizing this, the remaining attackers came in deliberately for the kill. Crew members were now at their ditching posts in the radio compartment, so the co-pilot took over the top turret and waited patiently for the enemy fighters to close in. When the nose of the lead FW came into his sights, the co-pilot pressed the trigger and caught the enemy cold at 125 yards. The last attacker was dispatched by another B-17 which by then had come to the rescue.

The pilot made a perfect landing with only one engine.

The plane remained afloat for three minutes.

Less than thirty hours later, members of the crew were rescued from the rubber dinghies.

The pilot who was responsible for this outstanding example of ditching had stressed the necessity for correct rescue procedure and regular dinghy drills.

LANDING a big bomber in the ocean and transferring its crew into a rubber dinghy about the size of a mattress is not an attractive sport.

It's a complicated and dangerous job which taxes the skill and resourcefulness of each member of the crew, and which, if not successfully executed, may shorten the life expectancy of the bomber's personnel.

The chances of survival when forced down at sea are in direct ratio to the interest shown by the crew in "dry run" ditching drill.

The need for a correct guide to such drill became evident to the British shortly after the RAF began its attacks on the European continent. It was obvious that every effort must be made to save valuable crews forced down in the Channel and North Sea. Studies of various forced water landings were made, and from these certain procedures were established and advocated.

The arrival of America's 8th Air Force necessitated an even more concentrated program of education along this line, plus the installation of an air-sea rescue unit. The Office of Flying Safety, Winston-Salem, N. C., was requested to study the problem and prepare a series of five posters outlining methods of ditching the B-17, B-24, B-25, B-26 and A-20.

This agency, after exhaustive studies, has completed five graphic posters suggesting the procedure for an ocean landing.

The welfare of the crew after the landing also has been taken into consideration in an emergency booklet soon to be out which carries a section dealing with ocean survival. This booklet tells the crew what to do after the landing has been successfully executed and the plane abandoned.

To gain a thorough understanding of ditching, the subject should be approached in three phases: preparation, actual ditching and subsequent survival.

The age old axiom, "an ounce of prevention is worth a pound of cure," has been cuffed about considerably but it provides an excellent golden rule

This illustration for a poster prepared by the Office of Flying Safety shows crew members abandoning their B-17 after a successful emergency landing at sea. The pilot is escaping through the left side window; the co-pilot, already out, is working back to the wing and his place in the right dinghy; the ball turret gunner, astride the fuselage, and the bombardier, just visible in the hatch, are the last to leave the radio compartment; the tail gunner is seated in the left dinghy holding a ration pack; the navigator is boarding the same raft while the radio operator holds the dinghy line; the left waist gunner is carrying a thermos jug across the wing; the flight engineer is sliding onto the right wing, and the right waist gunner is holding the right dinghy in place.

Your chances of surviving an emergency landing at sea are enhanced by constant drill in proper procedure.

to be followed by every bomber crew.

Preparation for ditching should start before the plane leaves the ground.

Drill comes first and foremost in preparation and is the direct responsibility of the pilot. It should include the practice of each crew member's duties after the order "prepare for ditching" is given until the rescue plane or ship arrives.

When each man knows his duty well enough to perform it mechanically, and if need be in a darkened ship, his education can be considered at least partially complete.

The wise pilot will also see that inspection of all equipment before long overwater missions is a *must*. This calls for a thorough check of each piece of emergency equipment, not only to see that it is in the plane but to determine whether it functions properly. This check includes the CO_2 cartridges on life vests and rafts. Ration kits without food or water are good for little other than bailing, so a check to see that water containers are filled and food is in good condition might stave off hunger and thirst if a forced landing occurs.

Signaling equipment is the one link raft occupants have with civilization. Thus the importance of workable accessories such as an emergency radio, Very pistols, sea marker and signaling mirrors is obvious.

A jammed hatch can become very annoying when water is up to one's neck and escape is essential to continued breathing. By testing escape hatches before take-off, crew personnel may avoid any such embarrassments.

It's too late to check these items after the ditching order has been given.

Contrary to popular belief, the camel is not alone in his ability to store water. Recent life raft tests conducted in the Gulf of Mexico proved that the human body also can store water.

Thus it is important that each member of the crew drink as much as he comfortably can hold before departing on an overwater trip. If a forced landing at sea appears imminent while in flight, it's a good idea for the crew to fill up from water stores which cannot be taken aboard the raft. This applies to food also.

The Mae West of stage and screen may be a glamorous gal but the life vest of the same name is a more practical companion for a man if his plane has let him down. In fact it is the most important piece of ocean survival equipment he possesses and should be treated as such. To get best results, the wearer should don it upon receipt, inflate both sides and adjust leg and waist straps. Otherwise he may find himself tied in a knot the first time it is inflated, and the wing of a sinking plane offers few advantages of a dressing room.

The pilot's popularity with his crew may have suffered slightly during the weary hours of drill, but it will bounce back to a new high when the ditching actually occurs.

Assuming that he is the pilot of a B-17 which is being forced down over water, a glimpse of the inside of the Fortress during preparation, actual ditching and escape should show the procedure outlined in the posters prepared by the Office of Flying Safety.

It is evident that his plane will have difficulty in reaching shore so the pilot notifies the radio operator to transmit a distress call, giving position, course and speed of the plane. Correct drill has taught him that it's always safe to be prepared in advance. If ditching seems unnecessary later, the call may be quickly cancelled.

If fuel is low—say only five minutes' supply remains — the pilot immediately issues the order to "prepare for ditching." A power landing is important.

Drill has been worked out on the ground, so each member of the crew responds in the order practiced—"co-pilot ditching," "navigator ditching," and so on, until each man has acknowledged the order.

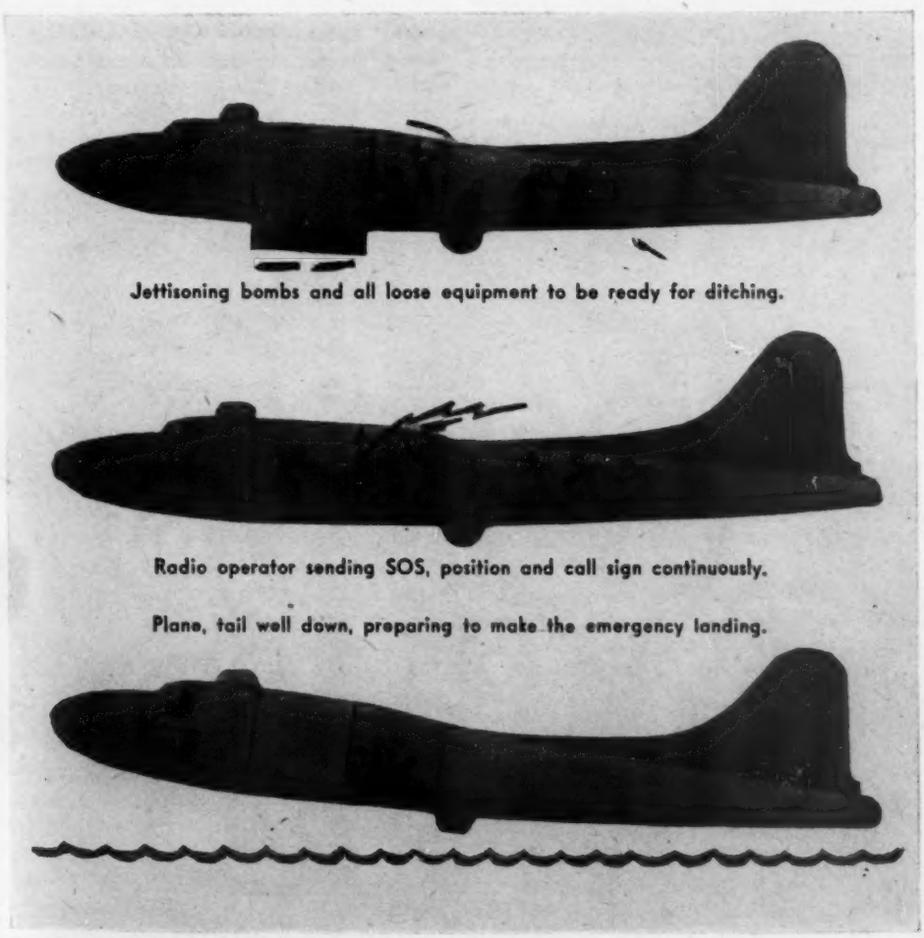
Crew members now loosen shirt collars and remove ties, lest they serve as a noose to strangle the luckless crewman. Unless the plane is at an altitude of over 12,000 feet, oxygen masks are removed. If over 12,000 feet, the main oxygen supply or emergency oxygen bottle is used until the pilot advises otherwise. Heavy flying boots are slipped off but clothing for the cold nights on the raft is worn.

The inside of the big bomber is a busy place now. Crew members are heaving out all loose equipment—guns, ammunition and anything that might serve as a lethal battering ram upon impact. Bombs and depth charges — if any — are jettisoned. If the plane is too low to permit this, they are placed on "safe." A rack full of live bombs is about as fragile as a sack of eggs but the effect upon impact is slightly more noticeable.

If the bombs have been successfully dumped, the bomb bay doors are closed to prevent an inrush of water upon landing. Landing gear is also up and all lower hatches are securely fastened after equipment has been jettisoned. Upper escape hatches on the other hand are jettisoned to facilitate a quick exit upon landing.

The navigator has found enough to keep him busy, since it's his duty to calculate position, speed and course.

Rescue units find it helpful to know the position of a plane forced down at sea, so the navigator passes this informa-



Jettisoning bombs and all loose equipment to be ready for ditching.

Radio operator sending SOS, position and call sign continuously.

Plane, tail well down, preparing to make the emergency landing.

tion on to the radio operator. The radio operator is plugging away at his set now, relaying all data handed him by the navigator and repeating it along with SOS calls.

The pilot has opened the window at his side and the co-pilot has helped fasten his shoulder harness as a guarantee that his face won't become part of the instrument panel upon impact with the water. The co-pilot has also opened the side window through which he is to escape and has pulled his seat well back, adjusting his own shoulder harness.

The pilot meantime has given the crew a running account of what's going on with repeated observations on the ship's altitude. Orders are not necessary because each man knows his job.

Members of the crew, having jettisoned equipment and closed hatches, are now proceeding to the radio compartment in much the same orderly manner that school children conduct a fire drill.

The navigator picks up maps and celestial equipment to carry into the life raft, and locates the emergency radio and signal set for later use.

The bombardier, after destroying the bombsight, goes to his position in the radio compartment, closing the forward door after him.

The flight engineer upon arrival jettisons the radio hatch or lowers the radio window and secures the emergency ration pack to his arm with an attached rope.

The ball turret gunner enters next, followed by the right waist gunner and left waist gunner, each carrying equipment for dinghy use which they have picked up aft in the fuselage.

The tail gunner follows with an emergency ration pack.

The radio operator remains at his post transmitting distress signals until the pilot orders him to take his ditching post.

All members of the crew are now in crash position in the radio compartment. Loose equipment has been jettisoned or thrown into the bomb bay. Both doors to the compartment are closed and equipment for use in the dinghies is firmly held.

Parachute pads, seat cushions and other padding are being used by crew members to take up the shock of impact, protecting their faces, heads and backs.

Five seconds before the impact, the pilot orders "brace for ditching" over the interphone or by pre-arranged signal. The radio operator, now in position, relays the order to other personnel in the compartment, having heard it over the interphone he is still wearing. The emergency radio key is clamped down so that signals are transmitted continuously until after the plane lands.

The crew now braces for the two impacts they have been taught to expect—the first a mild jolt when the tail strikes, the second a severe shock when the nose of the bomber ploughs into the waves.

All possible preparations have been completed and it's now up to the pilot to ditch the Fortress.

The crew may be thinking about the girl back home at this point, but the pilot is busier than a bootlegger at a traveling salesmen's convention. The sea below him is a tricky landing strip and he's probably trying to recall a few tips he learned during the ground drill.

Old sailors are familiar with the term "seaman's eye," which literally is the art of interpreting the sea. The pilot may not have developed "seaman's eye" but he recalls a few things that may help him set his lumbering bomber down.

Waves, for instance, move downwind in open sea and the spray from them tell him which way the wind is blowing, a much more reliable method than wetting a finger and holding it up. If there are no waves, he notes the wind lanes—nothing more or less than a series of lines or lanes of alternate strips of light and shade on the water. These also indicate wind direction.

To determine wind speed, he remembers a little table he studied:

A few white crests indicate 10 to 20 mph wind; many white crests 20 to 30 mph; foam streaks 30 to 40 wind velocity, and spray from crests indicates a wind speed of 40 to 50 mph.

If the sea is glassy—and it's most difficult to determine altitude under such conditions—the pilot may allow the trailing antenna to judge for him. When this antenna strikes the water, the radio operator will get the signal and pass it to the pilot.

Under this condition, the pilot approaches the sea with power on, flaps down, tail well down. If waves exist, he approaches into the wind at right angles to them. In case of swells, he knows that the plane should be landed along the top and parallel to the swell, provided the wind does not exceed ten miles per hour.

If the ditching takes place at night, landing lights may be turned on, provided the reflection does not confuse the pilot's vision. Bright lamps within the plane are turned off, but may be snapped on after landing to illuminate the scene and guide possible rescue parties which might be nearby.

Life jackets have been worn throughout the ditching. They should not be inflated until exit has been made. Otherwise they may be punctured or may prevent passage through the hatch.

Each man holds his position until the plane has come to rest. Now the ball turret gunner pulls both dinghy releases. This automatically inflates the stored life rafts, which pop out onto the wing. Personnel exit in the orderly manner practiced, each carrying a designated piece of equipment.

The order in which they exit and go to dinghies follows this pattern:

Pilot through side window to left dinghy, co-pilot through right window to right dinghy, tail gunner first from radio hatch to left dinghy, navigator next to left dinghy, then the right waist gunner to right dinghy, flight engineer to right dinghy, radio operator and left waist gunner to left dinghy and ball turret gunner and bombardier to right dinghy.

Another OFS poster illustration shows a B-25 forced down on a choppy sea. Two members of the crew launch a dinghy while the others see that emergency equipment is carried from the plane.

The rafts are attached to the plane by a line but members of the crew take precautions now to prevent launching the raft where it may be punctured by any jagged plane edges. Care is also taken that it is launched and inflated right side up.

It may be quite proper to jump into a fireman's net from a burning building but it is extremely hazardous to jump into a rubber life raft.

Some of the equipment needed will already be stored in the raft; the remainder which has been brought from the plane must be hauled aboard and securely fastened. A quick check is made immediately to insure the presence of all necessary items—ration kits, emergency radio and signaling equipment. Parachutes will be carried along by wise personnel since they can be used for sails, cover and protection against the sun.

Both rafts have cast off from the plane and are tied together. If the plane is still afloat, the crew knows it's a good idea to stick around. A raft is hard to spot on the ocean, but the plane's outline can be readily seen from the air.

The plane has been successfully ditched, personnel are in the dinghies and in all probability the nearest land is several miles down. Where to? is the next logical question.

There are no handy road signs—that's a cinch—and waves have a monotonous uniformity which doesn't identify one's whereabouts. Therefore, it's up to the navigator to furnish an estimated position either from calculations made aboard the ship or if at night by celestial navigation.

When all this has been decided, it's wise to lay out a course to some definite objective and then try to stick to it. There are three important aids to survival which won't be found in the emergency kits—determination to get ashore, calmness and common sense. Raft occupants should keep their shirts on — figuratively and literally.

Clothing not only protects the wearer from cold at night but staves off serious sunburn caused by direct and reflected rays of the sun. Protection from the sun is particularly important in the tropics. The tropical sun not only results in severe sunburn for the unprotected but increases thirst. The tarpaulin in which rations were wrapped or a sail may be rigged, yellow side up, as a canopy or sun shade. The yellow side is spotted more readily from a plane.

Having no knowledge of when land will be reached or a rescue effected, the pilot takes stock of food and water and plans a course of rationing to cover as much time as possible. Neither food nor water is allowed for the first 24 hours.

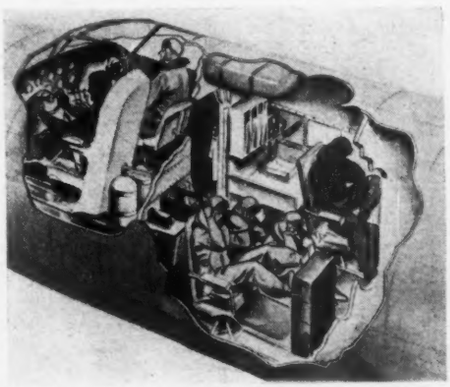
A man in good physical condition can live for twenty or thirty days without food. Without water, he can survive only about a week and a half at the most. With little water on hand, food should be eaten sparingly since it increases thirst. Water best serves as a thirst quencher when held in the mouth, swished about the tongue and gargled. Salt water as a beverage is taboo but as a cooling bath it may have possibilities, provided the hygienic raftsman keeps the water out of his mouth.

Gum-chewing relieves mouth dryness; smoking causes it.

In the event of rain, the tarpaulin or sail can serve as a rain catcher after the salt crust has been washed away. As much water as possible should be drunk, the rest stored in containers.

With sufficient water, food now poses a problem. The fishing kit provided in all rafts may not be Isaak Walton's idea of a complete set, but has proven that it will catch fish.

It is necessary to eat the fish raw but, strangely enough, raw fish is neither salty nor unpleasant to the taste if cleaned upon catching and washed free of blood.



B-17 crew members are shown in crash positions they take just before the plane strikes the water. These positions, maintained until the plane comes to rest, reduce the possibility of injury.

The liver and entrails may be used for bait.

Shark should be eaten only when water supply is adequate. This applies also to skates, rays, seaweed and crabs. Jellyfish, sea snakes, parrot fish and puffer fish are poisonous to humans. However, most fish found in mid-ocean are safe to eat.

Raft health has nothing to do with the condition of the rubber dinghy, although frequent checks of the craft are advisable. Raft health has to do with the physical condition of its occupants, which may fall below the Army doctors' standards if they've been in the raft for many days.

A raft ailment that can become serious unless proper precautions are taken is a condition known as "immersion foot." The extremity referred to becomes swollen and numb, and breaks out in sores if continually exposed to cold sea water in the necessarily cramped confines of the raft. If allowed to continue, serious infection may result. The best antidote is dry feet.

Similar exposure may cause salt water boils or burns. An application of sulfanilamide ointment and bandaging is helpful. Squeezing or pricking is dangerous.

Aside from water, signaling equipment may be classed as the most important equipment (with the exception of the raft and life vest, of course). Without signaling equipment rescue is a mere chance.

The emergency radio set, which is provided with a hydrogen balloon and kite to raise the antenna, should be used constantly.

Very pistol and cartridges, signaling mirror and sea marker, if easily accessible, can be used on instant notice. Only a few minutes will elapse between the time a rescue plane is sighted and the time it disappears over the horizon. The Very pistol if fired before the plane is overhead can be seen from the pilot's compartment. If the plane is directly overhead, there is little likelihood that the pilot will see it.

The sea marker, if placed in the water at the first sound of the plane, will form a large greenish-yellow spot on the surface, making the position of the raft visible.

If the sun is out, the mirror or a bright piece of metal is the best bet. These mirrors, which bear instructions on the reverse side, can be seen by a plane ten to fifteen miles away.

Upon spotting the raft, the plane notifies rescue units and within a short time the raft occupants are headed back to base.

The procedure outlined for the B-17 applies in general to the B-24, B-25, B-26 and A-20, with the exception of crash positions and the exits through which they escape.

Due to difficulty in ditching the B-24, Liberator crews have been advised to bail out, using one-man dinghy parachute packs, wherever possible. If ditching is necessary, however, almost the same procedure is followed.

Procedures for ditching the A-20 recommend that the bombardier bail out since his position in the nose of the ship is considered dangerous, and he has no other exit.

As for the B-25, power-off at 2,000 feet must be maintained if the top turret gunner and radio operator are to climb over the bomb bay onto the flight deck.

Procedures suggested in posters being prepared by the Office of Flying Safety are recommended merely as a guide to ditching. Because plane models are constantly undergoing revision, pilots have been advised to adapt the practice to comply with the model being flown.

Since land planes are not designed for sea worthiness, success in every ditching cannot be guaranteed even if proper procedure is followed. However, constant drill in such procedure will assure personnel a greater chance of survival. ☆

Roll of Honor

A MONTHLY RECORD OF DECORATIONS AWARDED TO PERSONNEL OF THE ARMY AIR FORCES

DISTINGUISHED SERVICE CROSS

Danver, Edison K., S/Sgt.
(Also PH and AM with OLC)
De Genaro, August V., Lieut.
Duval, Jessie V., Lieut.
(Also PH, DFC and AM with 3 OLC)
Embree, Hoy D., S/Sgt.
Forrest, Nathan Bedford, Brig. Gen.
Gibson, Balfour C., Lieut.
Harris, Arizona Todd, T/Sgt. (Also AM)
Harrison, James A., S/Sgt.
Johnson, Theron E., S/Sgt.
Jones, William, Jr., Lieut.
McGrath, Thomas J., S/Sgt.
(Also PH and AM with 3 OLC)
Vondrachek, Charles E., S/Sgt.

DISTINGUISHED SERVICE MEDAL

Stratemeyer, George E., Maj. Gen.
Viccellio, Henry, Lieut. Col.

LEGION OF MERIT

Amen, Henry J., Jr., Major
Anderson, Frederick L., Jr., Brig. Gen.
Bednarchuk, Antoni, S/Sgt.
*Braswell, John C., Lieut.
Breene, Robert G., Maj. Gen.
Carter, John F., Lieut.
Connolly, Donald H., Maj. Gen.
Daugherty, Jean H., Capt.
Dawson, Thurman E., Lieut.
Day, Jack E., W/O
Fretz, Eugene J., Lieut.
Gilardi, Albert J., Capt.
Grow, Malcolm C., Col.
Harmon, Hubert R., Maj. Gen.
Hunter, Frank O'D., Brig. Gen.
Jamison, Glen C., Brig. Gen. (Also DFC)
Johnson, Robert J., Sgt.
Lahm, Frank P., Brig. Gen.
Loomis, Francis J., Maj.
Maxwell, Warren A., Col.
Monteverde, Armand L., Capt.
McGinnis, Harold A., Col.
Nauroth, Howard M., Pvt.
Redburn, Ralph A., Maj.
Samford, John A., Col.
Shafer, Robert H., Lieut.
Smith, Albert D., Col.
Snouffer, William N., Lieut. Col.
Spencer, Harry E., Jr., Lieut.
Spina, Paul J., Sgt.
Stern, Benjamin, Brig. Gen.
Strahm, Victor H., Brig. Gen.
Sweetser, Luther W., Jr., Col. (Also AM)
Towle, Stewart W., Jr., Col.
Von Kolnitz, Alfred H., Maj.
*Walch, Felber J., Lieut.
Walker, William J., M/Sgt.
Wallis, Francis L., S/Sgt.
Walsh, Robert L., Brig. Gen.
*Wedel, Clarence, Pvt.
Wesley, Harold B., Capt.

SILVER STAR

Abraham, George M., S/Sgt.
Allen, Brooke E., Col.
Andrews, Vernon E., S/Sgt.
Arnone, Philip, S/Sgt.
Austin, Gordon H., Col.
(Also DFC and AM with 10 OLC)
Ayres, James A., Pvt. *(Also PH)
Baker, Francis W., T/Sgt. (Also DFC and AM)
Barnes, Roger T., S/Sgt. (Also AM)
Barr, Edgar E., Lieut.
Bartholomei, Victor H., Lieut.
Bartlett, George H., Lieut.
Bertram, William E., Lieut.
Bills, Ralph C., Lieut.
Block, Robert A., S/Sgt. (Also DFC)
Botts, Jack H., S/Sgt.
Brady, John M., Sgt.
Brannan, Henry P., S/Sgt.
Brinson, Sheldon S., Lieut.
Broadwell, Walter J., Capt. (Also AM)
Broman, Theodore H., Lieut.
Brown, Barlow Dean, F/O
Brum, Herbert L., T/Sgt. (Also AM)
Castle, Frederick W., Col.
De Shazo, Robert V., Lieut. Col.
Dolph, Robert H., S/Sgt.
Du Bois, Charles H., Jr., Lieut.
(Also DFC and AM)
Dyas, John R., Maj.
Edwards, Theodore H., Sgt.
Ferraiolo, Joseph, Sgt. (Also PH and DFC)
Fincher, Deltis H., Lieut.
Ford, V., Lieut.
Gladhart, David F., Lieut.
Gordon, Bobby H., Sgt.
Green, Malcolm, Jr., Lieut. Col.
Hane, Frank C., Lieut.
(Also PH, DFC and AM)
Hanna, Walter J., Jr., Maj.
Harding, Neil B., Col.
Hill, Rowland G., Lieut.
Hills, Frank J., Lieut. Col.
Hulteren, Russell L., Sgt.
(Also DFC and 2 OLC to AM)
Hunt, Jim H., Sgt.
Jennings, Jack H., Lieut.
Johnston, Richard B., Lieut.
Jordan, Rufus E., Lieut.
McClung, Robert A., Lieut.
Mcigs, Henry, Lieut.
Melman, Bernard J., S/Sgt.
Moore, Joreph F., Lieut.
Murrey, John S., Capt.
Nutter, Sheldon H., Lieut.
Olson, Harlan H., Lieut.
Patterson, Phillip E., Sgt.
Paynter, Maurice A., S/Sgt.
Perry, Alan B., T/Sgt.
Petit, Robert L., Capt. (With OLC)
*Reed, Joseph C., Lieut. *(Also Air Medal)
Richardson, Roslyn C., S/Sgt.
Ruiz, Ernest C., Lieut.
Scholl, Walter, Jr., Capt.
*Shannon, Charles R., Lieut.
Simmons, John C., Jr., Lieut.
Skeldon, Joseph L., Lieut.
Smyth, Glee G., Lieut.
Terrell, Frederick R., Col.
Turnbull, Robert J., Sgt.
Vos, Eugene L., Sgt.
Welch, Darrell G., Capt.
Welch, Wilbert R., S/Sgt.
Wilson, Delmar E., Lieut. Col.
Wilson, Earl M., Lieut.
Young, Franklin F., Lieut.

PURPLE HEART

Ackridge, Lee C., Sgt.
Anderson, Fred E., T/Sgt. (Also AM)
Avery, Stephen M., Maj.
Ballard, Frederick J., Cpl.
*Beasley, Leland V., Pvt.
Bentley, William C., Col.
*Boyle, Arthur F., Pvt.
Brainard, Ceylon H., Lieut.
*Brower, Rennie V., Jr., Pvt.
Brown, Vincent Caylor, Lieut.
(Also DFC and AM with 3 OLC)
*Carlson, Lawrence R., Pvt.
*Church, Leroy E., Pvt.
Decker, Walter B., Lieut.
*Defenbaugh, Russell C., Pvt.
*Eichelberger, Paul R., Pvt.
Land, George R., Jr., Lieut.
*Lango, Frank J., Pvt.
McWilliams, Robert, Lieut.
*Malatak, Joseph, Pvt.
Meyers, Harry M., S/Sgt. (Also AM)
*Moorhead, Lionel J., Pfc.
O'Brien, Donald G., Lieut.
*Reece, Philip D., Lieut.
Schatz, Jay J. G., Lieut.
Schoenauer, Lyle, Lieut.
*South, Wilmer W., Pvt.
*Stockwell, Carey K., Pvt.
*Sugrue, James F., Lieut. (Also AM)
Taucher, Ben T., S/Sgt.
Taylor, Paul R., S/Sgt.
*Tibbetts, Herman K., Pvt.
*Tuckerman, George W., Pvt.
White, Joseph W., Sgt.
*Zappala, Joseph S., Pvt.

SOLDIER'S MEDAL

Adams, Robert P., S/Sgt.
Barrett, Jesse W., T/Sgt.
Belenky, Eugene J., Sgt.
Bicket, Paul W., T/Sgt.
Blackman, Robert C., Lieut.
Blessman, Roy F., Cpl.
Broader, William E., Pvt.
Bryson, Paul H., Pvt.
Burkhart, Richard L., Pfc.
Cordell, James E., Cpl.
*Demorest, Max H., Lieut.
Elliott, Carl W., Pvt.
Emminger, Jerry W., Sgt.
Feather, William B., Sgt.
Fink, Edwin D., S/Sgt.
Fluharty, Wayne C., Pfc.
Furland, Paul F., Cpl.
Ganter, Eugene A., Pvt.
Hessenflow, Edmond L., Pfc.
Honea, Maurice L., Cpl.
Huey, Glenn, Pfc.
Kennedy, Arthur E., Lieut.
Lewis, Jackson W., Capt.
Lewis, John R., Cpl.
Lundell, Harvey G., S/Sgt.
Moenter, Joseph E., Pvt.
McDaniel, Clyde W., Pvt.
Newton, Robert E., Sgt.
Niszczak, Joseph J., T/Sgt.
Rawles, J. D., Sgt.
Reeves, Vernon H., Lieut.
Renna, Louis, Sgt.
Sabo, Alexander B., W/O
Simon, Reuben, Lieut.
Stowe, William A., Cpl.
Streicher, Refus E., Cpl.
Sweet, Robert E., Lieut.
Venturelli, Umberte, Cpl.
Wallace, Patrick E., Pvt.
Wexler, Nathan H., Capt.
Woodrum, James, M/Sgt.

DISTINGUISHED FLYING CROSS

Adams, Ralph B., S/Sgt.
Alexander, Ralph, S/Sgt. (Also AM)
Ambrosius, William H., Capt.
Anderson, Alf Lester, Cpl.
Anderson, James A., Lieut. (Also AM)
Armstrong, Ray W., T/Sgt. (With OLC)
Baca, Max S., T/Sgt. (Also AM)
Baker, Leonidas, Capt. (Also AM)
Baker, William V., S/Sgt.
Ballentine, Henry R., T/Sgt. (Also AM)
Ballantine, John V., Pvt.
Barber, Bernard L., Lieut.
Barefoot, Selwyn J., Capt.
(Also AM with OLC)
Barineau, James L., T/Sgt. (Also AM)
Barnard, Francis Dewitt, Capt.
Barnes, Albert H., S/Sgt. (Also AM)
Barnes, Cecil G., Sgt. (Also AM)
Barnes, Charlie, Sgt. (Also AM)
Barnum, Burrall, Capt.
Barr, Bernice S., Capt. (Also AM)
Barton, James D., S/Sgt. (Also AM)
Bates, James W., S/Sgt.
Baynes, Edward E., S/Sgt. (Also AM)
Bearden, R. T., S/Sgt. (Also AM)
Beniah, Robert J., Capt.
(Also AM with OLC)
Bentz, Edward K., Sgt. (Also AM)
Berry, Robert, Lieut.
Bickett, George L., Sgt. (Also AM)
Bigham, James H., Cpl.
Billings, Harry C., Jr., T/Sgt.
Billingsley, Leonard, Lieut.
Billmaier, Lawrence P., Cpl.
Blanchard, Frederick W., M/Sgt.
Blankenhorn, Charles, Jr., Capt.
(Also AM)
Bostwick, William E., Lieut. (Also AM)
Bradford, William B., S/Sgt. (Also AM)
Bradford, William R., Capt.
Brazelton, Leonard G., Sgt.
Brinkman, Willie E., Lieut.
Brown, Elton D., Lieut. (Also AM)
Brown, Llewellyn L., Lieut.
Brown, Therman D., Capt. (Also AM)
Brown, Vance, S/Sgt. (Also AM)
Bryant, Olen C., Lieut. (Also AM)
Burcky, Claude N., Lieut. (Also AM)
Burleigh, Albert H., Lieut.
Burnett, Pelham R., Lieut.
Busbee, Frank C., Lieut. (Also AM)
Campbell, James E., Lieut.
Campbell, William P., Lieut. (Also AM)
Carr, W. J., Capt.
Chandler, George W., Lieut. (Also AM)
Chennault, Claire L., Maj. Gen.
*Christy, John Y., Capt.
Clayton, R. L., Capt.
Clements, Pruitte L., T/Sgt.
Cofer, J. W., Capt.
*Cominole, David, Lieut. (Also AM)
Compton, Ruben C., T/Sgt.
Crabtree, Dale E., Sgt. (Also AM)
Crisp, Dennis, Capt.
Davenport, John D., Lieut.
Deans, E. G., Capt.
Doan, Donald F., S/Sgt.
Donovan, Charles Lane, Lieut.
(Also AM)
Dorband, Robert J., Sgt.
Doty, Donald E., Sgt.
Durham, Meredith E., T/Sgt. (Also AM)
Eastus, Wardin M., Cpl.
Eckley, Paul W., Jr., Lieut. (Also AM)
Edwards, Milton B., S/Sgt.
Edwards, Samuel, S/Sgt.
Eisenbrown, Walter Thomas, Lieut.
(Also AM)
Feltz, Maurice Stephen, Lieut.
Feramisco, James, Sgt.
Fetrow, Gene B., Capt.
(Also 3rd OLC to AM)
Filigenzi, Mario J., S/Sgt. (Also AM)
Flesher, Isaac A., S/Sgt.
Fox, Leonard M., T/Sgt.
Frederick, Harry R., Sgt.
Garriott, John A., T/Sgt.
(Also AM with 3 OLC)
Glassburn, Kenneth L., Lieut. (With OLC)
Glenn, Ralph E., Cpl.
Glenn, Symie L., S/Sgt. (With AM)
*Gough, Albert, Capt.
*Hansen, James S., Lieut.
Hanson, Paul, S/Sgt.
Harrison, Arthur D., Sgt.
Hastings, Richard, F/O
Hawley, Daniel Charles, Lieut.
Henriksen, Everett N., Lieut. (With OLC)
Higgins, Clarence G., S/Sgt.
Hinton, Percy M., Capt. (Also AM)
Holsey, Raymond E., Lieut.
Howk, Leon, Lieut. (Also AM)
Huey, Stanley George, Maj. (Also AM)
Hughey, Robert J., Maj. (Also AM)
Humphries, John R., Jr., Lieut. (Also AM)
Jackman, Robert J., S/Sgt.
Johnson, Emil L., Lieut.
Kersch, Conrad J., T/Sgt. (With OLC)
Kerulis, John P., S/Sgt. (Also AM)
Kicklighter, Conrad, Sgt.
Kiger, Orville W., S/Sgt. (Also AM)
Kociunas, Stanley J., Pvt.
Krieg, Philip R., Capt.
*Laberge, Lawrence L., Lieut.
Lanier, Fulton P., Lieut. (Also AM)
Leland, Glen V., Jr., Lieut.
Lenhardt, Edward J., S/Sgt.
Lincoln, Wayne E., Cpl.
Lindley, Harold O. R., S/Sgt.
Londer, Maurice L., Sgt.
(Also AM)
Lowder, Guy M., Cpl.
Lyons, George, Lieut.
(Also AM)
McBride, Charles R., Cpl.
McClaran, Clarence E., Capt.
McCoun, Gordon K., Lieut.
McCullough, J. A., Lieut.
McDevitt, Thomas E., Cpl.
McGarry, Christian H., Lieut.
McGrath, Thomas R., S/Sgt.
McKenney, Louis V., Lieut.
(Also AM)
McRoberts, Ellsworth E., Lieut.
(Also AM)
Makela, John E., S/Sgt.
(Also AM)
Mallett, Frank, Sgt.
Matulis, Nick, S/Sgt.
Maxwell, Lee W., Jr., Capt.
Meenagh, William F., Lieut.
(Also AM)
Michael, Oliver C., Cpl.
Miller, Donald C., Capt.
(With OLC and AM)
Morgan, Eddie M., Lieut.
(Also AM)
Moringstar, Joseph B., Lieut.
Morris, Ralph T., Sgt.
Morris, Robert F., S/Sgt.
Morrison, William J., S/Sgt.
Munson, Raymond G., Lieut.
Murphy, Daniel J., S/Sgt.
Nibley, Charles M., Sgt.
Nice, Albert T., Lieut.
(Also AM)
Norgaard, Arthur E., S/Sgt.
O'Donnell, John C., Lieut.
Ogle, Kenneth L., Jr., Lieut.
Olson, Orwin S., Cpl.
Ortiz, Cirilo O., Lieut.
Osborne, Edward G., Sgt.
(Also AM)
Owen, John E., S/Sgt.
Pacheco, Herman S., Jr., S/Sgt.
Padget, Cadman V., Lieut.
(Also OLC to AM)
Parsons, Hershell Echoll, Capt.
Parsons, Levi E., Jr., Cpl.
Peeples, Jack T., Capt.
*Phelan, Edward H., Jr., Lieut.
Poole, Stanley, S/Sgt.
(Also AM)
Porter, William W., S/Sgt.
Prince, Nathan D., Sgt.
*Probst, Victor V., T/Sgt.
(Also AM)
Procter, Edwin Allen, Capt.
Pylant, James H., Cpl.
Rathbone, Franks S., Jr., Lieut.
*Reece, Leslie E., Lieut.
Reid, Harland L., Lieut.
Reynolds, Norris T., S/Sgt.
(Also AM)
Reynolds, Oneal S., T/Sgt.
Rice, Charles D., Sgt.
Richards, George M., Lieut.
Rogers, Clarence, Cpl.
Rohr, Victor E., Cpl.
Roussel, Wilbur C., W/O
(Also AM)
Roy, Joseph S., Sgt.
(Also AM with 3 OLC)
Ryan, John L., Capt.
Sapp, William I., S/Sgt.
(Also AM)
Scarboro, Paul J., Lieut.
(Also AM)
Schadl, Martin M., T/Sgt.
(Also AM)
Scharp, Melvin C., S/Sgt.
Scheffey, Merl H., Lieut.
Schmid, George W., Sgt.
(Also AM)
Schneider, Edwin A., Lieut.
(With OLC)
Sell, Ramon C., S/Sgt.
Shafer, Eugene D., T/Sgt.
(Also AM)
Shemberger, James F., Sgt.
Shore, Walter G., Lieut.
(Also AM)
Silsby, Edward M., S/Sgt.
Slater, Richard I., Sgt.
Smartt, Clare M., Lieut.
*Smith, Fred M., Capt.
*(With OLC)

* Posthumous
† Air Carrier Contract Personnel, ATC

Lt. P. H. Daniels, 3d

Capt. Leonadis Baker

Lt. Maurice S. Feltz

Lt. Floyd S. Funk

Col. W. C. Bentley

T/S J. H. Thornton

Smith, Ray J., S/Sgt.
Smith, William C., S/Sgt.
Snyder, Delmer S., S/Sgt.
Staples, George M., Lieut.
Stearns, Willard R., Lieut.
Stein, Edward G., Cpl.
Steiner, Albert A., Lieut.
*Stephens, Maurice L., Capt.
Stipech, Frank R., Sgt.
Starr, Harold J., Sgt.
Stitt, Austin W., Jr., Capt.
(Also AM)
Stone, Elmer Jackson, Lieut.
Stoverm, George E., Lieut.
Sugg, Leroy, Lieut.
*Sullivan, John F., Capt.
Taylor, Homer R., Lieut.
Thall, Edward, Cpl.
Thorne, Ola P., Capt.
Turner, Kenneth H., Capt.
Upchurch, Gaston R., T/Sgt.
Urban, Harry, M/Sgt.
Wagner, Willis F., Lieut.
(Also AM)
Walker, Talmadge E., Lieut.
Walsh, James F., S/Sgt.
Watkins, Harvey O., Jr., Sgt.
West, William G., Cpl.
Whitehead, Charles D., Sgt.
Whitman, William B., S/Sgt.
Wise, John W., Lieut.
Woods, Merle C., Lieut.
(Also AM)
Zatzke, Frank W., Lieut.
(Also AM)
Zeamer, Jay, Capt.

OAK LEAF CLUSTER TO DISTINGUISHED FLYING CROSS

Casper, Kenneth D., Maj.
(Also AM)
Cottage, Stanley, Lieut.
(Also AM)
Ford, Emmette W., Lieut.
(Also AM)
Geckeler, John M., Lieut.
(Also AM)
Griffin, William J. P., M/Sgt.
(Also AM)
Payne, Conrad R., Lieut.
(Also AM)
Tarbutton, Paul R., Capt. (2nd)
Vail, Raymond M., Sgt.
Wallach, John A., Lieut.
(Also AM)
White, Herbert C., Jr., Lieut.
Wiest, Herbert E., Lieut.
(Also AM)

AIR MEDAL

Agee, James R., Sgt.
(With OLC)
Akes, Charles D., Pfc.
Alderson, Robert H., S/Sgt.
Alison, John R., Lieut. Col.
Alleman, Charles R., Sgt.
Allen, William, Sgt.
Allison, Otis E., Lieut.
(With 2 OLC)
Ames, Robert G., Sgt.
Anderson, Samuel H., Lieut.
(With 2 OLC)
Anderson, William M., Lieut.
Andrews, Norman L., Lieut.
Applee, Frank H., S/Sgt.
Ard, Gilbert H., Sgt.
Armstrong, Robert, Lieut.
Arnold, Rupert W., S/Sgt.
Arsenault, Lawrence J., S/Sgt.
Ascol, Holliel, S/Sgt.
Auger, Clifford M., Pvt.
Avdevich, Fillmore, Lieut.
Bailey, William A., Jr., Capt.
Baker, Edwin C., Capt.
Baldassare, Walter, Sgt.
Beringer, John L., S/Sgt.
Berry, Houston B., S/Sgt.
Bevan, Donald J., Sgt.
(With 3 OLC)
Biggers, Charles E., Lieut.
Biggs, Albert C., Lieut.
Bird, Clement W., Lieut.
Birdsong, George P., Lieut.
Blackwell, Westley V., S/Sgt.
Blake, Robert C., S/Sgt.
(With OLC)
Blanchard, George W., Lieut.
Bloomfield, Thomas F., Lieut.
Blum, Edward F., Lieut.
*Boehm, Walter, Sgt.
Bogert, William D., Sgt.
Bohlen, Dean W., Lieut.
(With OLC)
Bolle, Norman N. V., Lieut.
(With OLC)
Boluch, Stephen, Lieut.
Bone, Jim K., Lieut.
Boney, Warren X., Lieut.
Boothe, Harry J., Lieut.
(With 3 OLC)
Borostowski, Benedict B., T/Sgt.
Borowsky, Joshua, Sgt.
Bowie, Donald R., S/Sgt.
Bowman, Horace D., Lieut.
Bowman, John Poole, Lieut.
Boylan, George S., Jr., Lieut.
Brady, John B., Capt.
Brandt, Waldo B., S/Sgt.
(With OLC)
Bragg, Kendrick, Lieut.
(With 3 OLC)
Brannon, Joseph W., Sgt.
Breunig, Wilbur W., Lieut.
Brewster, Edward M., Lieut.
Brodsky, Edward J., Lieut.
Brookhart, Joseph, Lieut.
Broussard, Eddie J., Capt.
Brousseau, Andre R., Maj.
†Brown, J. E., ATC
*Brown, Willard L., Lieut.
Bruckheimer, David, Lieut.
Brumett, Lee S., Sgt.
(With 2 OLC)
Buckner, Kermit C., S/Sgt.
Burns, Francis J., S/Sgt.
Burnstad, Basil B., Lieut.
(With OLC)
Bush, Edwin R., Lieut.
Calvano, Albert F., Sgt.
Campbell, Robert B., Capt.
Canham, Arthur Eldridge, Lieut.
(With 2 OLC)
Carboni, Dominick, Sgt.
Carney, Arthur O., Sgt.
Carr, Joseph P., Lieut.
(With OLC)
Carter, Arthur C., Lieut.
Chesser, Robert E., Lieut.
Christy, Charles W., Lieut.
Clancy, William E., Capt.
Clark, Roderick C., S/Sgt.
Clifton, Raymond C., T/Sgt.
Clymer, Gerald F., Lieut.
(With OLC)
Coates, Darrell W., S/Sgt.
Colantoni, William, Lieut.
Combs, Mack, Sgt.
Conner, William H., Lieut.
(With 2 OLC)
Cook, Emmett G., Lieut.
Cook, Warren G., Sgt.
Cooke, Charles J., Lieut.
Courtney, Clyde Thomas, Sgt.
Cox, Burton D., Lieut.
Coyle, Gervais G., Lieut.
Crandall, Arthur L., S/Sgt.
Crane, John E., Lieut.
Cranmer, Edwin A., Lieut.
Crichton, Douglas E., Lieut.
Croon, Richard D., S/Sgt.
(With OLC)
Crouch, Horace E., Capt.
Cruikshank, Arthur W., Jr., Lieut.
Cummings, Duke D., Lieut.
(With OLC)
Curtis, Ferd J., Lieut.
*Curtis, Frazier, Lieut.
Dalton, Dean H., Lieut.
Damaske, Marvin L., T/Sgt.
Daniels, James J., Sgt.
Daniels, Patrick H., III, Lieut.
Darden, James H., Lieut.
Dasher, Everett A., T/Sgt.
†Davidson, John F., ATC
Davis, Charles J., S/Sgt.
Davis, Charles M., S/Sgt.
Davis, Elvin Albert, S/Sgt.
(With OLC)
Davis, Gene F., Lieut.
Davis, Robert E., Lieut.
Day, Donald E., S/Sgt.
Dayley, Burns Richard, S/Sgt.
Dean, George B., Lieut.
Dehoy, Peter F., T/Sgt.
DeBusk, James H., Sgt.
Decker, Kenneth R., Sgt.
Dennis, Stephen C., Lieut.
Depke, Robert W., Lieut.
Dern, Ernest W., S/Sgt.
Dexter, John H., Lieut.
Dick, Charles S., Sgt.
Dobson, Eugene H., S/Sgt.
Dowd, William H., Lieut.
Downs, Emory M., Lieut.
Drake, Carl H., Sgt.
Drake, Clarence H., Lieut.
Dreher, John S., Lieut.
Dudeck, Edward J., Lieut.
Dumas, James L., Lieut.
Dunham, Howard M., Lieut.
Dunham, Volia A., Jr., Lieut.
Dustin, Kenneth H., Lieut.
Eareckson, William O., Col.
Edward, James O., S/Sgt.
(With 2 OLC)
Edwards, Lyle V., T/Sgt.
Ehrhardt, Clark A., S/Sgt.
Eidson, Jordon B., Sgt.
Elledge, Raymond P., Lieut.
Elliot, Wilson C., S/Sgt.
Embach, John W., Lieut.
Emerson, Arthur R., Lieut.
Emery, Albert W., T/Sgt.
Epperson, Malcolm N., S/Sgt.
Espitallier, Eddie F., T/Sgt.
Evans, Frank B., Lieut.
(With 2 OLC)
Farnworth, Stanley L., S/Sgt.
Farrar, John W., Lieut.
Ferguson, John S., Sgt.
Ferrara, John C., Lieut.
(With OLC)
Ficeto, Bartholomeo Tony, Sgt.
(With OLC)
Finneburgh, Edward I., Lieut.
Finney, George R., Sgt.
Fitzgerald, Robert J., S/Sgt.
Fleming, Eugene B., Sgt.
(With 3 OLC)
Fonorow, Milton S., Lieut.
Ford, William A., Jr., S/Sgt.
Fore, DeWitt G., S/Sgt.
Fortin, Raymond W., Lieut.
Fowler, Raymond B., Lieut.
Fox, Gayle S., Lieut.
Freligh, Gerald C., Sgt.
Frixholz, John T., T/Sgt.
Fulton, Frederick Peter, Lieut.
Funk, Floyd S., Lieut.
Gable, Clark, Capt.
Gannon, James F., Sgt.
Garner, Stanley C., T/Sgt.
Garrett, Wilmer J., Lieut.
Gates, Frank A., T/Sgt.
Gillogly, Fred D., Lieut.
Gilman, Mark H., Lieut.
Gilroy, Walter E., T/Sgt.
Gipple, Harvey W., Sgt.
Glover, Harold Elmer, S/Sgt.
(With 2 OLC)
Good, George E., Lieut.
Goodrich, Miles C., M/Sgt.
Graddy, William C., S/Sgt.
Grainger, James R., S/Sgt.
Granoff, John H., Sgt.
Grant, Reginald D., Lieut.
Graves, Alvin L., Lieut.
Gray, Deckerd J., Jr., S/Sgt.
Green, George L., Sgt.
Green, William A., T/Sgt.
Greene, Donald R., Lieut.
(With OLC)
Greil, Gerald C., Lieut.
Greve, Thomas E., Lieut.
Gritsonis, Nickolas C., S/Sgt.
Gross, Gale H., Sgt.
Grube, Willie W., Lieut.
Guthrie, Allen S., Pfc.
Haas, Joseph E., Lieut.
Hagenbuch, Glenn E., Capt.
Hails, Clair D., S/Sgt.
Hale, Zeffra I., Capt.
Hamilton, Joseph L., Lieut.
Hamilton, Linton D., Lieut.
Hamilton, Robert A., Sgt.
Hammer, Arthur J., Lieut.
Hancock, Robert E., A/C
Hanks, Joseph D., S/Sgt.
Hansbury, Thomas J., S/Sgt.
Hansen, Dale W., S/Sgt.
(With OLC)
Hardwick, James W., Lieut.
Harmon, Edward Z., Sgt.
Harris, Francis H., Capt.
Harris, Maurice L., Sgt.
Harris, Reginald G., S/Sgt.
(With OLC)
Hart, James C., Lieut.
Hartman, William J., Lieut.
Harvey, Herbert H., T/Sgt.
Harvey, John F., Lieut.
Hatleberg, Maynard M., T/Sgt.
†Hay, James B., ATC
Haynes, Roy R., Sgt.
Hays, Marlborough L., Sgt.
Haywood, James W., S/Sgt.
Hazleton, Walter L., S/Sgt.
(With OLC)
Heap, Howard A., S/Sgt.
Hubbard, Henry F., Lieut.
Hubbard, Olan L., Lieut.
Hudson, Henry D., Lieut.
Huggins, Harry W., Sgt.
Hughes, Aquilla B., Jr., Capt.
Hughes, Septimus R., Lieut.
Humphries, Bert W., Lieut.
(With OLC)
Hunt, William Louis, Lieut.
Hurlbert, Norman F., S/Sgt.
Hussleton, John W., S/Sgt.
Hutson, Joseph T., T/Sgt.
(With 2 OLC)
Hutter, William B., T/Sgt.
Hutton, John N., Lieut.
Ingram, Donald H., S/Sgt.
Isbell, James A., Lieut.
Jacknik, Frank J., Lieut.
*Jackson, Everett C., S/Sgt.
Jefferson, Harley W., Lieut.
Jeffries, Oren L., Lieut.
Jester, Donald E., S/Sgt.
Joffrion, Joseph S., S/Sgt.
Johns, Malcolm B., S/Sgt.
Johnson, Billy S., S/Sgt.
Johnson, Charles C., S/Sgt.
Johnson, Gerald R., Lieut.
(With OLC)
Johnson, Grove C., Lieut.
Jones, Jerald H., Sgt.
Jordan, Roy E., Sgt.
Joslin, John W., Lieut.
Jostenski, Robert B., Lieut.
Karanson, William A., Jr., S/Sgt.
Keen, William R., Sgt.
Keenan, James H., Capt.
Kehoe, Nicholas B., Jr., Lieut.
Kissenbarth, Stanley N., Lieut.
Kitzman, Gordon A., Lieut.
Klug, Lester G., Sgt.
Knippel, George C., M/Sgt.
Krippner, Howard L., Lieut.
Kruszynski, Gerald J., T/Sgt.
(With OLC)
Kuhn, Merton, T/Sgt.
Kuenning, Thomas E., Lieut.
Kulchesky, Harry, S/Sgt.
Kurtenbach, Kenneth J., S/Sgt.
Kuzdrall, Anthony A., M/Sgt.
(With OLC)
Kwasneske, Henry J., S/Sgt.

(Continued on next page)

Capt. J. H. Keenan

Lt. Robert A. McClung

Lt. Claude N. Burcky

Lt. Deltis H. Fincher

Capt. G. Davidson, Jr.

Lt. John R. Humphries

Roll of Honor

A MONTHLY RECORD OF DECORATIONS AWARDED TO PERSONNEL OF THE ARMY AIR FORCES

Lawson, Clarence V., Lieut.
Leary, Edward J., Sgt.
Leasure, William C., Lieut.
Lecuyer, Orval E., S/Sgt.
Lee, James F., Lieut.
Leeker, Walter C., Lieut.
Leines, Harold Jerome, S/Sgt.
Leow, Richard E., Lieut.
Lewis, Grant R., S/Sgt.
(With OLC)
Lipe, Fort W., Lieut.
Lockhart, Russell D., Lieut.
Loewecke, William E., Lieut.
(With OLC)
Long, Alan W., Capt.
Long, Winfield V., S/Sgt.
Lowery, Glen F., Lieut.
Lubner, Martin M., Lieut.
Lucas, Jack, Sgt.
Ludlow, Jack, Lieut.
(With 2 OLC)
Ludolph, George L., Lieut.
Ludwig, William R., Capt.
Lugasewitz, Julius V., Sgt.
Lundy, James T., Lieut.
(With OLC)
Lunsford, Hoyt H., Lieut.
Luschen, Frank L., Lieut.
Luther, Martin, Lieut.
(With OLC)
Lutz, John R., Lieut.
Lyle, Lewis E., Capt.
Lyman, Thomas G., Lieut.
Lynch, Joseph, S/Sgt.
MacDonald, Donald W., Maj.
McAdams, Lee D., Jr., S/Sgt.
McArthur, T. H., Capt.
McCabe, Kenneth C., Sgt.
McCarthy, Eugene J., Capt.
McCarty, Martin W., Jr., Lieut.
McCauley, Anthony C., S/Sgt.
McCord, Robert R., Lieut.
McCurcy, Arthur, Lieut.
McDaniel, Abner O., Lieut.
McDonald, Robert Lewis, Lieut.
McDonnell, Walter S., Lieut.
McDonnell, William J., Sgt.
McEntire, Bruce M., Lieut.
McFerrin, Jesse W., Lieut.
McGahan, Chester, Lieut.
McGehee, Thomas K., Maj.
McGill, Woodrow M., Lieut.
McKay, Mack, Capt.
McKee, Carrick, S/Sgt.
McKelvey, Van Dycke, Lieut.
McKesson, Lewis R., Lieut.
McKinnon, Frederick W., Jr., Lieut.
†*McMakin, Ralph A., ATC
McWilliams, Major H., Lieut.
Magee, Roland, S/Sgt.
Mahan, Lloyd J., S/Sgt.
(With OLC)
May, Chester H., Lieut.
May, John M., Sgt.
May, Otis W., Lieut.
Mayotte, Robert A., T/Sgt.
Means, Lucian W., Jr., T/Sgt.
Meaux, Allan F., S/Sgt.
Mehales, John, S/Sgt.
Melton, Robert E., Lieut.
Mendenhall, Dean, Lieut.
Meyer, Charles F., Lieut.
Middleton, Laula Mathew, Lieut.
(With OLC)
Migdat, Walter M., S/Sgt.
Miller, Norris C., T/Sgt.
Miller, Robert C., Lieut.
Milliner, James H., S/Sgt.
Mills, Hawley Pierce, Lieut.
Milnes, Arthur C., Sgt.
Miser, Harry D., S/Sgt.
Mitchell, Anthony B., Lieut.
Mock, Jacob S., Jr., Sgt.
Mohler, William A., S/Sgt.
(With OLC)
Mohr, Homer H., Lieut.
Monaghan, Bernard I., Cpl.
Monroe, Rayford L., T/Sgt.
Moon, Billy E., Lieut.
Moore, Albert K., Lieut.
Moore, Donald M., Lieut.
Moore, Leonard J., Lieut.
Moore, Robert T., Sgt.
Moore, Wilson, Capt.
Moorer, William G., Lieut.
Morgan, Robert, S/Sgt.
Morgan, Robert K., Capt.
Morrison, Samuel M., Sgt.
Moser, George R., Lieut.
Muldoon, Bernard R., Lieut.
Mulligan, James C., S/Sgt.
Mullen, Everette J., Jr., Lieut.
(With OLC)
Mulvana, John B., Lieut.
Murphey, William F., S/Sgt.
Murphy, Kimmel P., Capt.
Murray, Gilbert A., S/Sgt.
(With OLC)
Naismith, Robert E., Lieut.
Nall, Charles C., Cpl.
Nance, Clifford P., S/Sgt.
Nardine, Howard H., S/Sgt.
(With OLC)
Nease, Charles M., Sgt.
Nelson, Norman R., Lieut.
Newman, Fred J., Sgt.
Nichols, Edgar S., S/Sgt.
Nielsen, Leland C., Lieut.
Niver, Keith M., S/Sgt.
(With OLC)
Noid, Woodrow V., Capt.
Nothstein, Howard, S/Sgt.
Nysteen, Norman A., Lieut.
O'Brien, Leonard H., Sgt.
Ochsner, Leo A., S/Sgt.
Odell, Edward N., Lieut.
Ogan, Wilson E., T/Sgt.
Olds, Sherwood W., Lieut.
Oliver, Ralph L., Maj.
Orchard, William, Capt.
Ormand, Waverly C., T/Sgt.
Orris, Harry F., S/Sgt.
Pace, Lawrence B., Lieut.
Pack, James L., S/Sgt.
Padget, Charles A., Lieut.
Paine, Charles J., Lieut.
Pennington, James L., Sgt.
Pennoyer, Jordan M., Lieut.
Perkins, Charles V., Sgt.
Perry, William W., Capt.
(With OLC)
Peterson, Herbert M., Sgt.
Peterson, Richard A., S/Sgt.
Peterson, Warren C., Capt.
Peylock, Thomas R., Sgt.
Phillips, Charles R., Lieut.
Phillips, Reginald H., Lieut.
Pietrowski, Walter, S/Sgt.
(With OLC)
Plaskett, Kermit R., S/Sgt.
Plecha, Stanley L., Lieut.
Ploeger, Roy I., M/Sgt.
Polhamus, Floyd C., S/Sgt.
Porter, Lambert C., Lieut.
Powell, John F., S/Sgt.
(With 2 OLC)
Powers, John D., Lieut.
Praul, George L., Pvt.
Prescott, Paul H., S/Sgt.
Price, Jerald C., Capt.
Prichard, Jarvis B., Lieut.
Prieston, George E., Capt.
Pritsky, Joseph J., Lieut.
Pruitt, Elliott C., Lieut.
Purdy, Norman E., Lieut.
Quickel, Cortez S., Lieut.
Quinn, John J., Lieut.
Rabinovitz, Harry, Cpl.
Rabo, Fred A., Lieut.
Ragland, William A., Lieut.
Rallo, Jacob W., S/Sgt.
Ramputi, Frederick R., Lieut.
Rand, Claude M., Sgt.
Raymer, Winston C., S/Sgt.
Rebello, Francisco, Sgt.
Reeder, Jack D., Capt.
Regan, James, Lieut.
Reigh, Carl B., Cpl.
Rethman, Vincent C., Lieut.
Rex, John L., Jr., Lieut.
Reynolds, Joseph C., Lieut.
Ribeck, Joseph, Sgt.
Ridnour, Gerald J., Sgt.
Riechers, Delbert W., Sgt.
Rieman, Robert R., Lieut.
Roberts, Wallace M., S/Sgt.
Robertson, Arthur B., Jr., Lieut.
(With OLC)
Robinson, Richard R., S/Sgt.
Rocney, John W., Lieut.
Roder, Helmuth V., S/Sgt.
Roitsch, Clarence A., Lieut.
Rolf, Leland S., Lieut.
(With OLC)
Rooke, Walker, Capt.
Rooney, John W., Lieut.
Roozen, Edwin C., Lieut.
Roth, Charles L., S/Sgt.
Rouse, Arthur, Jr., Lieut.
Roviaro, Ermando P., S/Sgt.
Rowland, Daniel W., S/Sgt.
Rukes, Merlyn D., S/Sgt.
Ruppenthal, John J., Lieut.
(With OLC)
Ruse, John C., Capt.
Russel, Roy C., Lieut.
Ryan, James A., Lieut.
Sagnibene, Charles V., S/Sgt.
Salitrnik, Robert J., Lieut.
Sanderson, Ellis J., Lieut.
Sauer, Robert R., Lieut.
Savage, Francis E., Lieut.
Sawyer, William F., Lieut.
Saylor, George R., T/Sgt.
Scannell, Joseph W., Lieut.
Schafer, Robert T., S/Sgt.
Schepis, Thomas F., Lieut.
(With OLC)
Schildt, William J., Lieut.
Schlafmitz, Leonard, Sgt.
Schneiderman, Henry G., S/Sgt.
Schwendiman, Ray J., Lieut.
Scott, John W., Lieut.
Sedore, Richard S., Sgt.
(With OLC)
Sennott, William J., Jr., Sgt.
Sentz, Vernon R., S/Sgt.
Setzer, Marvin J., Lieut.
Sproi, Anthony, Lieut.
Shaeffer, Earl A., Lieut.
(With OLC)
Sharp, Budrow C., S/Sgt.
Sharp, Frank D., Maj.
Shaw, Roger T., Lieut.
Shelfer, Edward P., Pfc.
Shepard, William G., Capt.
Sherwood, Lyle D., Lieut.
Shirley, Homer C., Lieut.
Short, Willard K., Lieut.
Sibold, George G., S/Sgt.
Siboski, William R., S/Sgt.
Siler, Stanton T., Sgt.
Silk, Lawrence J., Jr., Sgt.
Simmons, Herbert W., Lieut.
Simmons, Hylan V., S/Sgt.
Simons, Raymond L., T/Sgt.
Singleterry, Harold C., S/Sgt.
Skipp, Francis E., Jr., Lieut.
Slankard, Paul B., S/Sgt.
Slater, Carl W., Sgt.
(With OLC)
Sledd, Claude, Jr., Capt.
Sloan, Charles R., Lieut.
Sloan, George E., Lieut.
Sloan, William J., Lieut.
Small, Mitchell, Sgt.
Smart, James L., Lieut.
Smith, Albert G., Lieut.
Smith, Darwin N., Sgt.
Smith, Edward H., Sgt.
Smith, Gene N., T/Sgt.
†Smith, G. W., ATC
Smith, John R., Lieut.
Smith, John W., Lieut.
Smith, Joseph Russell, Lieut.
Smith, Lemuel B., Lieut.
(With OLC)
Smith, Merle Elmer, Lieut.
Smith, Richard L., Sgt.
Smith, Robert W., Lieut.
Smith, Sidney T., Capt.
Sommer, Marcel W., S/Sgt.
Soria, Peter, Sgt.
Soup, John R., Lieut.
Spring, Gilbert M., Lieut.
Spurrier, Odith K., Lieut.
Stage, Albert Ames, S/Sgt.
(With OLC)
Stainick, Samuel, Lieut.
Stamateios, Pete D., S/Sgt.
Stampon, Peter J., Lieut.
Stanek, Bernard J., Lieut.
Stappler, Robert F., Lieut.
(With OLC)
Starbuck, James H., Maj.
(With OLC)
Steele, Earl A., Lieut.
Stein, Eugene H., S/Sgt.
(With OLC)
Steiner, Irwin O., Lieut.
Stellhorn, Bernard A., S/Sgt.
Stephens, Nelson M., S/Sgt.
Stephey, Harry M., Lieut.
(With OLC)
Stevens, David M., Lieut.
*Stockard, Luther B., Lieut.
Stokes, Woodrow H., Lieut.
Storey, Seely M., S/Sgt.
Stout, George A., Lieut.
Stover, Glenn R., Lieut.
Strauss, Kenneth R., Lieut.
Stuart, Harold K., Lieut.
Stupelli, Harvey L., Sgt.
Swais, John T., Capt.
Swenson, Donald A., Lieut.
Swinney, James W., S/Sgt.
Sylvester, Joseph J., Lieut.
(With OLC)
Taylor, Albert D., Sgt.
Taylor, John J., Lieut.
(With OLC)
Taylor, Walter R., T/Sgt.
Tedder, John G., Cpl.
Thomas, Homer E., Lieut.
Thomas, Jerry E., Lieut.
(With OLC)
Thomas, Reuben L., Jr., Lieut.
Thompson, Charles S., Jr., Lieut.
Thompson, Clyde A., Lieut.
Thompson, Garnett B., Sgt.
Thompson, James D., S/Sgt.
Thompson, Norman L., S/Sgt.
Thompson, Thomas E., Cpl.
Thomson, John A., Lieut.
Thornbury, Edward M., Lieut.
Thornton, James Henry, T/Sgt.
(With OLC)
Tidwell, John L., Sgt.
Tolar, Robert F., S/Sgt.
Tracy, George A., S/Sgt.
Trankle, Herbert B., Lieut.
Trimpe, Melvin J., Lieut.
Tudor, James R., Lieut.
(With OLC)
Twiggs, George S., Lieut.
Uhle, Richard B., Lieut.
Ulrich, Chester S., Sgt.
Vance, Kenneth M., Sgt.
Vanderneck, Richard V., T/Sgt.
Van Lear, Harry P., Jr., Lieut.
Varnado, Marvin E., Sgt.
Vaughn, Aubrey R., S/Sgt.
Verinis, James A., Lieut.
Waggoner, Wetsel D., Lieut.
Wagner, Walter A., Jr., Lieut.
Waldroup, Marvin M., Lieut.
Walker, Robert K., Lieut.
Wallace, Robert E., Sgt.
Wann, Harry A., Lieut.
(With OLC)
Ward, Arthur N., Jr., S/Sgt.
(With 2 OLC)
Ward, Grady B., Lieut.
Ware, John F., Lieut.
Warner, Harold W., S/Sgt.
Warner, James R., Maj.
Watkins, Percy B., Lieut.
Watts, Escar, Jr., Capt.
Weamer, Raymond P., Lieut.
Webb, Kenneth C., T/Sgt.
Weed, Charles H., Lieut.
Weeks, Murry E., Lieut.
Weiss, Lester, Lieut.
Welch, Edwin L., T/Sgt.
Weniger, Alfred M., M/Sgt.
Werner, Miles A., Lieut.
(With 2 OLC)
Wertz, Wayne E., Sgt.
White, Jack C., Lieut.
White, Thomas A., Lieut.
(With OLC)
White, Thomas R., Jr., S/Sgt.
Whitman, Jack W., S/Sgt.
Wilde, Linn E., Jr., Lieut.
Wilison, Martin E., Capt.
Wilkinson, Douglas, S/Sgt.
Wilkinson, William R., S/Sgt.
Williams, Edwin Warner, Lieut.
(With OLC)
Williams, Leon, S/Sgt.
Williams, Walter A., Lieut.
Williams, Walter M., Col.
Willis, Boyce B., Cpl.
Wilson, Nunnary, Lieut.
*Wilson, Owen T., S/Sgt.
Wilson, Ray, Jr., Lieut.
Wingfield, Robert L., Lieut.
Wintermoyer, Hugh C., T/Sgt.
(With OLC)
Winzer, Ted M., Lieut.
Witsell, Edward F., Jr., Lieut.
Wolfe, Fred J., Lieut.
Wood, Charles L., Jr., Sgt.
Wood, John R., S/Sgt.
(With OLC)
Woodfolk, Edmund T., Lieut.
Wright, Leo R., S/Sgt.
Wright, Robert H., S/Sgt.
Wyler, William, Maj.
Wyly, Glen R., S/Sgt.
Wynn, Walter L., S/Sgt.
Yaussi, Frank D., Lieut.
Zahos, George E., Lieut.
Zeigler, Philip R., Capt.
Zelasney, Edward J., S/Sgt.
(With 2 OLC)
Zick, Marvin D., Lieut.
Ziemer, Frederick B., T/Sgt.
Zinkovich, Michael C., Lieut.

OAK LEAF CLUSTERS TO AIR MEDAL

Altman, Fredric G., Lieut. (2nd)
Alvey, Joseph R., S/Sgt. (3rd)
Anderson, Roland V., Sgt. (2nd)
Anderson, Stanley M. M., Lieut. (3rd)
Art, Robert J., Lieut. (3rd)
Bagwell, Leon L., S/Sgt. (2nd)
Balaban, John A., Lieut. (2nd)
Bishop, Warren Riley, Sgt.
Bobinski, Henry P., Sgt.
Boyd, James R., Sgt. (4th)
Browe, Robert E., Sgt.
Carlson, Francis B., Maj.
Davidson, George H., Jr., Capt.
Forrester, William H., S/Sgt.
Gibson, Roy H., S/Sgt.
*Grubb, Gerald I., T/Sgt.
McMahon, Thomas D., Sgt.
Nisbett, William L., T/Sgt.
Rumph, Duane W., Sgt.
Shearer, John H., Sgt.
Shoemaker, William G., Lieut.
Stampley, Clarence R., Lieut.
Williams, William E., S/Sgt. ☆

Lt. Clarence H. Drake

Col. Brooke E. Allen

Lt. K. L. Glassburn

Capt. Dennis Crisp

Col. W. O. Eareckson

Lt. Oren L. Jeffries

HENDERSON TOWER

The early days on Guadalcanal were like this for the men of the Army Airways Communications System.

The old tower, partially dismantled.

By Capt. J. E. ROBERTS and Staff Sgt. JOHN R. DUNN

ARMY AIRWAYS COMMUNICATIONS SYSTEM

Henderson Field on Guadalcanal isn't what it used to be. The wail of the air raid siren is more of an event now; Jap bodies no longer lie around to smell up the place. Most important of all, supplies have come in—supplies that make Henderson look like one of the many well-kept airbases in the South Pacific. Gone are such landmarks as the old Henderson control tower which weathered one Jap raid after another, its flimsy uprights battle-scarred from slugs of flying steel. A stronger, more carefully built structure has since taken its place, but the old tower might well have been called the cornerstone of Henderson Field. Its story is essentially the story of the tower operators who served during those early days. They were boys who had become men overnight—men of the Army Airways Communications System — and their story might be termed the jive translation of that official phrase, "The former enemy airfield is now in operation." This is their story.—THE EDITOR.

THE quick black of the tropic night settled down among the palm groves of Guadalcanal and a great yellow bomber's moon rose out of the quiet sea, pouring its amber light along the runway of Henderson Field, down through the tops of the swaying palms, stealing up the crude, angular lines of the control tower.

Two young men, their figures vague and shadowy in the odd half-light, leaned over the railing which enclosed the platform of the tower and peered down from their perch, now into the dispersal areas, now over the runway, now out to sea. A field telephone jangled harshly. One of the men reached out, automatically, without turning his head, and took the telephone.

"Henderson Tower."

A thin metallic warning crackled through the instrument.

"Bogies coming. Direction southeast. Stand by for Condition Red."

"Roger."

The tower operator who put down the phone was tall and stripped to the waist, and a blond fuzz struggled to form a beard on his face. He turned to his companion, and, as though picking up an interrupted conversation, said:

"All right, Dog Face, you can quit pining for Lamour. Tojo's little boys are coming over to play. On with the receiver, and let's keep posted on the slant-eyed spooks."

The other operator, small and dark, reached for his headset. A loud speaker sputtered and through it came a distinct monotone:

"One Victor Two Three calling Henderson Field."

"Sold American!" the blond boy sang out as he grabbed a mike and flipped a switch. He went on in a monotone, "Henderson to One Victor Two Three. Go ahead."

"Search flight coming to you two minutes out. Request landing instructions, please."

"Come in and circle the field. You may have to go out again; Charlie is headed down the slot. Stand by and we'll give you the dope."

"Roger."

He put the mike aside. The other boy turned to him and said, "These binocs don't help worth a damn in this light. Can't see a sign of the bogies yet."

"Can't see 'em?" shouted the blond one, snatching the binoculars from his companion's hand. "F'crissakes, who ya think you are, Superman? You couldn't see 'em in this light if they were right overhead. What's the matter with you, buckin' for Section Eight?"

"It's the sweatin' them out gives me the jitters, I guess," the dark one said quietly. "Just plain scares the hell out of me."

"You and me both. Those bombs whistlin' and crashin' around don't make like lullabies, son. A guy who says he doesn't get the shakes is a Grade-A snow artist."

The other laughed. "If every one of these raids takes a year off your life,

brother, have a look at the walkin' dead."

"Yeah, those fox-hole prayers of ours must be payin' off. Otherwise we'd be S.O.L."

The loud speaker broke in, blaring, "Bogies closing in fast from southeast. Two flights of three medium bombers each. Condition is red."

The blond, fuzzy-faced kid became all business. "Give 'em those lights," he said, jerking his head toward the field. "Hit the foxhole and leave the door open. I'll bring in this rubberneck flight and do a power dive right after you."

His companion looked at him, not moving. "Relax, junior," he said, "Let's both bring 'em in."

"OK, but you don't have to stay here on Condition Red, you know."

"Save it. Here go the lights."

The signal flare lifted and faded in the pale night, and with it came a raucous cacophony of old auto horns, gongs, clanging brake drums, and harsh voices. Over in the tent area, the lights went out as if turned off by a single switch.

Now the moon had the field to herself. The incoming search flight was overhead, its planes circling the landing strip.

On the ground, planes began warming up for the scheduled interception, their slipstreams churning great clouds of dust.

By now the Bogies were overdue.

In the tower, five speakers blared at top volume. The blond boy, his fingers clicking at switches, carried on a half dozen conversations, while his companion, pointing a directional-beam gun into the sky, signalled with green flashes to the planes coming in from the search flight.

From one speaker, "Bogies now orbiting. Direction south southeast."

Suddenly, the noise quieted down in the tower, and then from below, new noises were added to the roaring of the planes—noises from the tent area where the men were shouting, gibing, catcalling and whistling, like kids in a neighborhood movie on Saturday afternoon. Something like the kids, the men in the tent area were catcalling partly at the Japs, partly because their own movie had been called off for the raid.

The two tower operators were tense. The blond fingered the controls of the speakers, and the other played with the signal light. From time to time they grinned uneasily.

"You know," said the dark one, "This place really does have the old South Seas romantic atmosphere. At least in the moonlight it does. What a night to pitch a bit of woo . . . Anything new on the Bogies?"

"Nope. That flight of bombers we sent out early this evening is due back pretty soon or we could watch the little son-of-heaven's fireworks from the dugout."

"Yeah, from our nice, comfy little foxhole. Cozy like a sewer."

"Sewer? I've seen you whip in there, son, like it was Shangri-la. Oh, oh, there goes the searchlight over behind the mountain battery. Hear any motors?"

Soon they both could hear a peculiar, desynchronized motor sound—"Washing-machine Charlie." Then, as the noise seemed to be coming from directly overhead, six searchlights stabbed into the sky and converged on one plane high above.

"Let's see what the anti-aircraft boys can do tonight," said the blond, looking up at the plane. "Last time they had Charlie hitch-hiking to hell in nothing flat. Oh, oh. Sticks away! Hit the deck!"

As they dropped flat they could hear the shrieking whistle of the bombs, then a thudding roar as one struck, and boom, boom, as others hit. The bombs whistled and blasted, and each brief pause between sticks was filled in with echoes reverberating far out over the jungle.

The blond boy raised his head. "You know what they remind me of? A big Douglas fir being felled. You hear that wind-splitting whish speed up as the branches whip through the air, and then —boom! She hits the ground. Timber-r-r-r!"

With a ba--loom that the men could feel press against them, a big one struck nearby. The tower seemed to lift, then it dropped and swayed and trembled. "Boy! That was close," said the blond, "but you see what I mean."

"Fir trees, he says. Those damned things sound to me just like a fast freight high-balling over a crossing back home in Kansas. Listen and you'll get it—that kind of trembling roar."

Another bomb hit close by.

"Bing, bam! Thank you, ma'am! That last baby jarred my bridgework. You OK?"

"Roger. Let's take a look and see if he's using his good eye tonight."

They got up and looked from the platform over the moonlit field. "Set 'em up in the other alley," said one. "He didn't even hit the hospital area this time."

"Every time we get a bombing, I hope he lays an egg near our tent. We'd sure get a swell start on a new foxhole. Save us a lot of digging."

"Boy-oy, the ack-ack boys are hotter than a two-buck pistol tonight. Look at them bounce Charlie around. See him slip that one. Bet he got a fanny full on that burst."

"You ain't beating ya gums, son. One more Charlie will miss some Geisha necking. If that hit's confirmed, it costs me just five bucks even. I bet that noisy AA corporal a fin that they wouldn't get a hit the next time they had a target. I won't even get to help drink up the fin. We won't get any beer around this place unless we make it."

A faint, imperative voice from a loudspeaker broke into their talk. "One Victor Four Three calling Henderson Tower. One Victor Four Three calling Henderson Tower. Go ahead, Henderson."

"Henderson calling One Victor Four Three. Henderson calling One Victor Four Three. You are S5, R5. Go ahead."

The light-haired kid listened awhile, and turned.

"Hey, quick, junior, alert the crash crew! Tell them to stand by for a crash landing on the strip. Get an ambulance there. Two unidentified planes, too, huh? A couple of Charlies pulling a sneak!"

The other operator dove to a phone,

This field siren was made from horns stripped off an abandoned Jap automobile.

while his companion went on talking with the men in the air.

"How much gas does your lowest plane have left?"

"Plenty. A couple of hours. How about landing instructions?"

"Hold everything. Circle the field until we identify the strangers. A P-38's going upstairs right now to look 'em over. Calling Four Victor Six Six. Calling Four Victor Six Six. Take off when ready, from the mountains to the sea."

From the P-38, "Roger, thank you."

The 38 roared down the strip, lifted and then zoomed upward, climbing almost vertically. The two men could see the strange planes, and the P-38, hanging on its props, rising toward them high in the moonlit sky. The boys listened to the pilot over the loudspeaker: "Four Victor Six Six calling Henderson. Two medium Jap bombers. And I'm right behind them, closing in now. Here we go. Tally ho."

Other planes in the air came in over the loudspeaker. "Take 'em apart, boy! Teach the little bastards to sneak in without a ticket!"

Other messages were received and the blond boy, answering one, said "Plane with wounded, land on the strip. Mountains to the sea."

"Roger; wilco."

"Which one is it this time, Gracie Allen again?"

"Nope, Butterfingers this time. She's got no more landing gear than a bathtub."

Another plane cut in over the speaker, "Tell him to stick his feet out the bomb bay and run like hell."

"Crash on the strip from the mountains to the sea. Good luck to you."

"Hate to do this. Butterfingers is gonna rip her Sunday panties. Embarrass the lady. Well, here we come."

Another speaker blared: "Six Peter One Two calling Henderson Tower."

"Henderson calling Six Peter One Two. Go ahead."

"Military transport coming in with general officers aboard. Request immediate landing instructions."

"CAN y'beat that," the operator muttered, after flipping the turn-off switch on the microphone. "Those office boys bothering us at a time like this!"

He switched back in. "Sheer off and backtrack on your course a few minutes. Then come in again for instructions. Combat traffic over field."

"Roger," came the meek reply.

Both men leaned over the railing of the control tower and watched as the plane with the wounded hit the mat. As it touched the ground with the dirt spraying up alongside it like water around a speedboat, the ambulance, crash trucks and jeeps roared across the runways. The propellers splintered into the air. The battered plane finally scraped to a halt, and before the emergency vehicles could reach it the crew members piled out.

"Guess this baby won't be a blazer, thank God! Call the strip and see what the score is."

The dark-haired operator plugged in on the command post party line, waited, then broke in: "What's the tale on those last two landings? Yeah? Swell! Nobody seriously wounded? We saw all the crew walk away from the crash. To hell with the plane—the men are safe."

Another interruption: "Six Peter One Two calling Henderson Tower. On my way back to you. Have you landing instructions for us?"

"Come in and circle the field, but don't land until you get the green light." The boy at the transmitter turned to the other: "Guess we'd better get the rest of the technical unit in first. Let the brass hats wait."

"OK, I'll green light 'em. The strip is clear now. Tell 'em to land there." He took up the signal gun, pointed it at the leading plane of the flight coming in and flashed the green landing beam. The planes came in, almost nose to rudder, swung into the taxi strip and parked in their area.

The blond young man was still complaining about the generals. "Now we can green light the big shots. With this important stuff out of the way we can roll out the red carpet for 'em, too. Too bad we don't have an eighty-piece band." He told the transport to follow the bombers in.

"Wonder how the Lightning is doing with the gate-crashing Charlies?"

AACS shower at Henderson. Re-fueling pump produces 30 lbs. water pressure in the airtight drums.

"Don't worry about that baby. Those P-38s are bad news to anyone who has the bad luck to tangle with 'em. He'll make a good Jap out of a live Jap, wait and see. I'll call the message center and find out what they've heard."

On the phone, "Hello, Harry, any message from that 38?"

"On his way in. Just talked to the AA command post and they say one of the Bogies is down in the drink. The 38 got him in two bursts. No enemy craft now, so we're waiting for 'em to declare Condition Green. Wait up! Here it comes. OK. Condition Green!"

"Thanks, boy," and the young man on the tower hung up, turned to his friend, and said, "Time for lights, bub. All clear."

HE recharged his signal pistols, and, brandishing them like a cowboy star riding into town, he shot them into the air. This time the flares were green, and they were faint in the white moonlight. Lights began to wink all over the area.

In the tower the tension was over.

"How about a coke, junior. A nice, ice-cold coke?"

"D'ya feel all right, Daddy? I'd even settle for a warm coke!"

"You'll settle for a chlorine-cocktail and like it."

"Hey," yelled a man from the foot of the tower, "those frag bombs damn near chopped down this thing."

"Not frag bombs. The beavers did it." The dark young man tossed a canteen to his companion. "Here, have some horse medicine." ☆

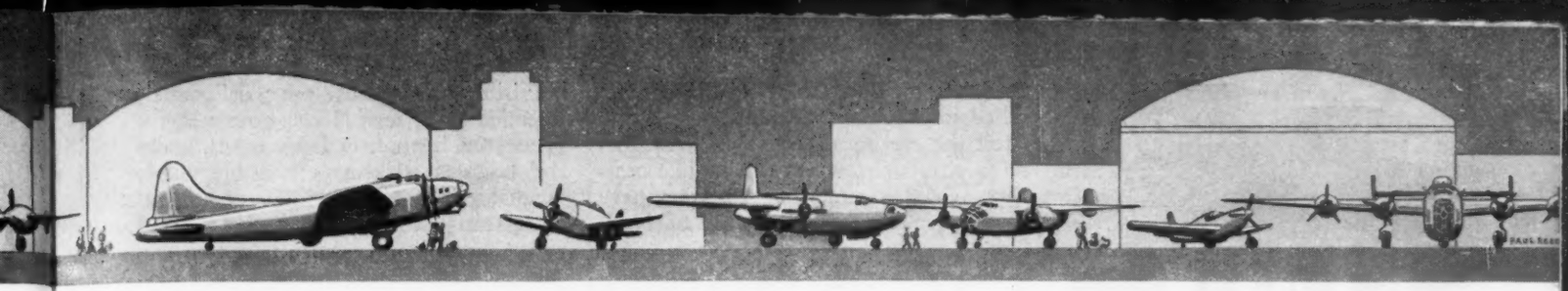
ON THE LINE

WHAT'S WRONG WITH THIS PICTURE?

Clumsy maintenance is apparent in the men swarming around this engine. It is our guess, however, that Cpl. Andrew J. Greska, on the end of the engine mount, is smiling to himself at the snafu poses. Staff Sgt. John J. Bailey, seated on the maintenance stand, also insists that he knows better. For that matter, so do Cpl. Richard L. Satterlee, on the wing, and Pvt. Vern Wickline, top center. Attached to the 88th Depot Repair Squadron at Patterson Field, Ohio, the men got quite a kick out of posing the ON THE LINE boners for December.

Sergeant Bailey can point out six boners in this picture. They are listed on Page 56. Can you find more?

Careful maintenance work—knowing the rules and following them—is just about as important as dropping bombs when the airplane is finally ready. In fact, you can't have one without the other. Watch your Ps and Qs ON THE LINE. Better yet, watch the TOs.



A MONTHLY MAINTENANCE ROUNDUP PREPARED IN COLLABORATION WITH THE AIR SERVICE COMMAND AND THE TECHNICAL INSPECTION DIVISION, OFFICE OF THE AIR INSPECTOR

Every Mechanic an Inspector . . .

Before installing a part on an airplane or engine, examine it closely for possible defects, even though the part bears a serviceable tag. Damage can occur before the part reaches you. It may have been dropped, stepped on, or it may have fallen from the parts truck enroute. What happens if you put your entire trust in the tag and install it?

Not long ago a de-icer fitting was installed on an airplane, and during inspection a tube was found flattened, closed shut and cracked at one end. Fortunately this was discovered before the ship was flight tested. Man hours were wasted, however, removing this part and installing another.

Usually caught by inspectors before the airplane leaves the shops, a defective part in many instances cannot be detected by visual inspection. Only in flight do these defects show up—then it's too late.

Another example: A vacuum pump was installed on an airplane, but the gasket did not have the hole in the proper place to permit oil to circulate from engine to pump. After the installation had been completed, the omission could not be detected by a visual inspection. The airplane was released for flight and after several hours of flying the pump went dry and the vanes froze fast to the body of the pump. Consequently the shaft snapped, causing complete failure of the vacuum system and rendered most of the flight instruments inoperative.

Men, look those parts over before you begin an installation. Examine tubing closely, so that nothing obstructs passage of various fluids. Examine parts which function mechanically for perfect condition. Consider yourself an inspector—you'll save many hours and help to eliminate crashes and forced landings.

On Servicing Airplanes . . .

It's time for a discussion of gas servicing practices ON THE LINE. Here are a few things to refresh your memory concerning this everyday routine job you mechs perform so often that now and then it is easy to get careless.

Are you connecting the static discharge clip or plug prior to putting the nozzle in the tank as outlined in TOs 12-1-10, 06-5-1 and 12-1-7? Are you making the mistake of dragging the refueling hose across de-icer boots (TO 03-35B-1)? Are you remembering to replace a worn grounding chain to the refueling unit? To insure contact over rough ground AR 850-20 requires four inches of chain to be dragging; check TO 12-1-10 also.

Is the radio or other electrical equipment in operation during refueling or cleaning? TO 01-1-1 states that no smoking, open flame or electrical devices will be permitted or operated at this period.

Are you improperly utilizing the catch on the servicing nozzle to hold the valve open when the tank is nearly full? This practice results in an overflowing tank and creates a fire hazard and a potential danger to personnel due to the gas flying up in the face of the servicing mechs.

Remember that AAF Regulation 85-6 prohibits the parking of refueling units within 100 feet of hangars. Naturally, this also means never park them *inside* the hangar. Airplanes are not to be refueled nor gas drained inside the hangar, according to this regulation.

Additional reminders: It would be well to check and see that gasoline lines and packing joints are being maintained properly. Particularly is trouble encountered in the packing joint where the fuel line enters the hose reel. Concerning this, brush up on TO 19-25 series.

Fill 'Em Up . . .

Oxygen cylinders now being installed in combat aircraft are non-shatterable and are intended to be filled to at least 400 pounds pressure. Actually, they should be filled to 425 pounds to allow for a slight drop in pressure which occurs when they cool. Refer to TO 03-50-1.

Smooth (unbanded) cylinders, with the exception of type H-1 bail out cylinder and type A-2 portable cylinder, are not shatterproof and should not be filled to more than 300 pounds in combat areas in accordance with TO 03-50-9.

Watch the Welds . . .

Mechs, you may prevent a fire in the plane you're working on by checking carefully for cracks in sections of fuel lines, fuel vents and drain lines which have been welded. If you find a leak and repair it before the crack has grown larger and becomes a fire hazard, you have gone a long way toward saving a crew and plane.

A Good Motto . . .

A plane is no better than the mechanic who services it.

Bird in the Hand . . .

A new TO, "Handling and Releasing Homing Pigeons from Aircraft in Flight," is beamed particularly to flying personnel, but it also has definite interest for ground crewmen as well. If a plane equipped with pigeons runs into trouble, the TO (01-1-120) tells flyers how to get the birds out of the plane safely and with messages properly attached. Pigeons are almost infallible, but they do get thirsty and hungry so one might drop by your hutch looking for a handout.

If you know how to catch him, you may be able to speed the message to proper authority. Water is the best bet since after flight that is the first thing on the pigeon's mind. Food comes second. If these baits fail, shoot him. If you can

get your hands on him alive, do so by grasping the bird over the outer flight (wing) feathers far enough forward so that your thumb and first finger are placed to hold his legs still. Captured that way he'll live to fly again. If shot, consider him as emergency rations.

Every army uses pigeons. If flying purposefully, they are best left alone. If wandering aimlessly, resting or injured, they should be captured. You may intercept vital news from the opposition. ☆

BLACK LIGHT

By Dr. S. M. Burka
MATERIEL COMMAND

THE mystery which has apparently developed concerning so-called "black light" and the phenomenon of luminescence calls for some clarification.

Electromagnetic waves, like water waves, run the gamut from ripples to ocean rollers. The ripples measure one ten-billionth of an inch from crest to crest, the rollers hundreds of feet.

The shorter of these waves we call X-rays and the longer, radio waves. Out of this tremendous group one tiny octave, sixteen millionths of an inch to thirty millionths of an inch, from crest to crest, affects the eye as light. The shortest visible waves produce the sensation of violet and longer ones, in order, blue, then green, yellow, orange and red.

The combination of all the visible waves produces the sensation we call white. We see objects, except self-luminous ones, by the light reflected from them, and their colors are determined by the wave lengths they reflect. If they reflect all wave lengths they will appear white when illuminated by white light, and black if they reflect none. A white object therefore will appear green if illuminated by green light and red if a red light is employed. A green object appears green to white light because it reflects only green light and not blue or red, and it will appear green if green light falls on it. If red light is used to illuminate a green object, it will appear black because the object does not reflect red light.

Waves too long to affect the eye are called infra-red, while those too short to affect the eye are called ultra-violet. Because ultra-violet waves behave like ordinary light, but cannot be seen, they have been given the popular name of black light.

The reaction of certain substances to ultra-violet rays forms the basis of AAF cockpit lighting systems. Such substances absorb the ultra-violet which falls on them and re-emit the absorbed energy as light of longer wave length. Since wave lengths longer than that of ultra-violet affect the eye, they are visible and we have the remarkable effect of seeing objects illuminated by invisible light.

This property, commonly called fluorescence, is present to some degree in a large number of substances. Varnish, paper, the skin, finger nails, the teeth (except false teeth) and the lens of the eye, all glow when "lighted" by ultra-violet light. But in addition to these, many dyes and minerals fluoresce very strongly. These materials are called "luminescent." *Luminous* materials are those which generate their own light energy, while the *luminescent* ones require activation by external energy sources.

Luminescent materials are divided into two classes. Those which cease emitting light when the activation stops are called fluorescent. They black out as soon as the ultra-violet lamp is turned off. Materials of the second class, called phosphorescent, store up energy and continue to emit light for a limited time after the activation ceases. Some phosphorescent compounds continue to glow for six or eight hours after external activation has ceased.

Although fluorescent light emitted is always of longer wave length than that of the exciting radiation, it bears no relation to the color of the materials as seen in daylight. As a consequence, we have pigments, white or yellow in daylight, which shine with blue, green, yellow or red light under the ultra-violet lamp.

Radium salts also cause fluorescence so that if traces of radium should be incorporated in the pigment, the glow will continue indefinitely. Under the ultra-violet lamp this type of pigment shines brightly, but when the lamp is turned off the glow decreases immediately if fluorescent, or slowly if phosphorescent, until the level determined by the amount of radium is reached. This level of brightness is then maintained indefinitely, and the material never completely blacks out.

The system of ultra-violet lighting permits extreme flexibility and control of cockpit lighting. The cockpit can be flooded with black light yet nothing will be visible except those parts deliberately intended to be seen. The lamp itself, the panels, the instrument faces, labels, knobs and brackets all remain invisible. Only the dial graduations, the instrument pointers, essential labels or other parts marked with luminiscent pigments appear—in any color desired, regardless of their daylight color.

If fluorescent materials are used, perfect control over the brightness can be exercised. When the lamp is turned down the brightness of the markings decreases, and when the lamp is turned off the markings disappear instantly. If some critical markings must be visible at all times, radium is added to the pigment used and, when the lamp is turned off, these particular markings will drop to the low light level desired, remaining at that level indefinitely.

AT present, AAF cockpit instruments are marked with a green luminescent-phosphorescent material because, at the time ultra-violet lighting was adopted, this was the only stable material available. Since the material is phosphorescent it does not respond immediately to changes in intensity of the lamp but lags several minutes behind. Then, if the lamp is extinguished, it will continue to glow for an hour or more. This glow is *not* due to radium content. In fact, only about six of the instrument types have any radium and this small amount is on only a few critical graduations of the basic flight instruments. To perceive any difference, it is necessary to keep the instrument in total darkness for an hour or more. By this time the phosphorescence will have died out and the radium activated marks will be the only ones remaining visible. The radium brightness is at a very low level and it is necessary for the observer to keep his eyes in darkness for at least a quarter of an hour before he can see the markings.

It has long been known that if the eyes are kept in darkness for a half hour or more they become enormously sensitive to faint light. This process is known as dark adaptation. If one looks at a bright light after dark adaptation the dark sensitivity will be lost and another period of darkness will be required to restore it. Naturally the brighter the light the more complete will be the loss of dark adaptation, but a very interesting fact has been noted in this connection: The shorter visible wave lengths are more effective in this spoilage than the longer ones. A blue light will ruin this dark adaptation as quickly as a white light of the same brightness, but a deep red light will have considerably less effect. A red flashlight or red floodlight bright enough to permit reading may be used safely without serious effect on dark-adapted eyes, whereas a white, blue or green light of the same brightness may com-

An explanation of luminescence and how it is being used for night-lighting cockpit instrument panels.

pletely nullify the sensitivity acquired in the adaptation period.

Since the dark-adapted eye is extremely sensitive, a four watt bulb will provide ample illumination. The bulb, which emits visible as well as ultra-violet light, is enclosed in a housing with a glass window designed to filter out all visible light while permitting passage of ultra-violet rays. Actually this glass transmits a little blue and a little red so that a faint purple light is seen if one looks directly into the lamp. At the same time a white fog appears due to the fact that the eye itself fluoresces and the interior of the eye therefore lights up. This fog decreases the ability of the eye to see outside objects so care must be taken in placing the light mounting to prevent any direct ultra-violet light from falling on the eyes.

Now that stable fluorescent materials have been developed, advantage will be taken of these facts in modifying cockpit lighting systems. Since we desire complete control of brightness, luminescent-fluorescent materials are to be used. Then if the lamp is dimmed the dials will dim correspondingly. When the lamp is turned off the cockpit blacks out instantly. Except for night fighters, a few essential flight instruments will have markings in radium-activated fluorescent material. These marks will continue to glow at a very low level, but which will be readily visible to the dark-adapted eye.

Since either red or ultra-violet illumination is to be used (red because it does not spoil the dark adaptation), the reflection color (i.e., color to daylight) will be nearly white. In order to preserve further the dark adaptation, the fluorescent color is to be orange instead of the present green.

The number of graduation markings will be decreased to the minimum necessary, but additional graduations to those necessary for flight will be required for purposes of calibration, testing and the like. Their markings will be in a green non-luminescent material. The non-luminescent material is invisible under ultra-violet light and being green will be invisible also under red flood lighting.

The new dials therefore will show only the minimum markings when used at night, but by daylight will give all the data required. ☆

In Summary

Black Light—the invisible rays that light up instrument dials in a cockpit—is one of the common phenomena of electromagnetic waves that is difficult to understand principally because it cannot be seen.

Its use in airplanes is essential to protect the night vision of pilots and to keep the cockpit dark, thereby preventing disclosure of the plane's presence and position to enemy aircraft.

Present instrument dials emit a pale greenish light reflection which continues to glow after all light sources have been eliminated. Discovery of a new stable luminiscent material that is fluorescent but not phosphorescent now enables instantaneous blackout of all dials. This material, developed to emit an orange reflection as further protection for the pilot's night vision, is being applied to all new instruments as rapidly as manufacturers can change over.

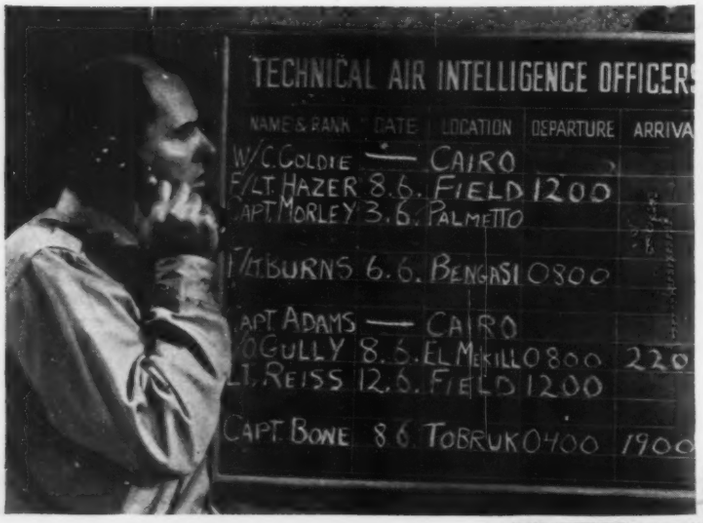
TECHNICAL

1—The scene opens with a group of intelligence officers discussing the ME-110 and expressing the desirability of gaining access to one of the planes reasonably intact to determine its operational characteristics.

IN the inspection of enemy equipment, the discovery of some small detail may lead to a revision of tactics and a more successful operation against similar equipment in combat.

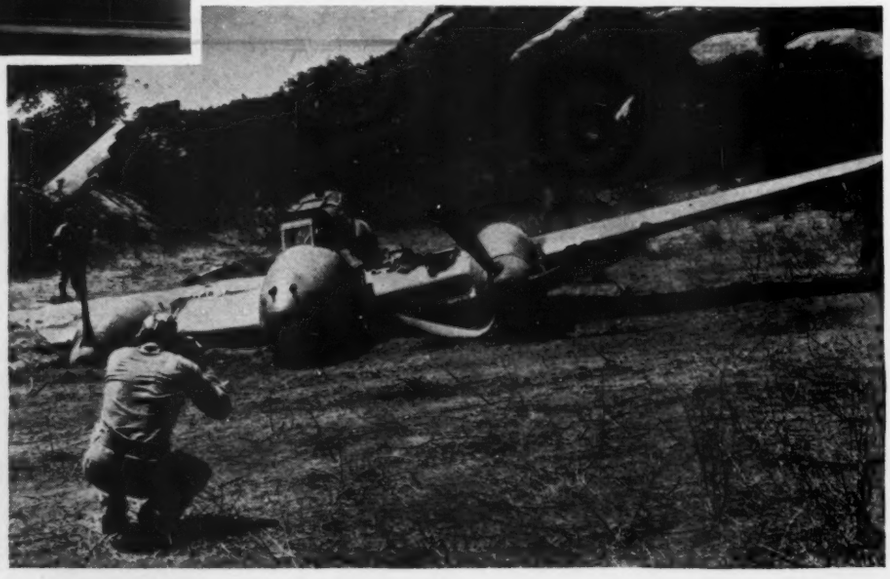
This is the theme of a new training film (TF 1-869) "Technical Intelligence, Inspection of Enemy Materiel," produced by the AAF First Motion Picture Unit in Culver City, Calif. The story concerns the inspection of a wrecked German ME-110 and the resulting discovery of a vulnerable spot in the plane's construction.

2—Meanwhile, in the African theatre, a P-40 pilot reports that he has shot down an ME-110 and that the plane appears to be salvageable. The intelligence officer calls Base A-2.


TECHNICAL AIR INTELLIGENCE OFFICERS
NAME & RANK | DATE | LOCATION | DEPARTURE | ARRIVA
W/C. GOLDIE — CAIRO
F/LT. HAZER 8.6. FIELD 1200
CAPT. MORLEY 3.6. PALMETTO
F/LT. BURNS 6.6. BENGASI 0800
CAPT. ADAMS — CAIRO
GULLY 8.6. EL MERILLO 0800 220
LT. REISS 12.6. FIELD 1200
CAPT. BOWE 8.6. TOBRUK 0400 1900

3—A-2 checks the assignment board and puts a crash-officer, Captain Morley, on the inquiry. Captain Morley departs immediately for the crash scene.

5—After a preliminary examination of the wreck, Captain Morley snaps photos of the plane from all angles for the intelligence records.



4—On reaching the plane, Morley jots down notes as he talks with Lieutenant Haines, in charge of the guard placed over the wrecked fighter.

INTELLIGENCE

6—Captain Morley's problem is to discover why the plane went down. He examines the instruments and finds them in proper working order.

7—He then discovers that someone has removed a name plate. When the lieutenant asks why it is so important, Captain Morley explains that every part has a story to tell and so is of value. Lieutenant Haines hands over the name plate which he had taken as a souvenir.

8—Captain Morley sees a guard flicking ashes into a rounded fragment of metal. Other similar fragments were picked up, and it is found that the explosion of oxygen equipment caused the fighter to crash.

9—The conclusions were verified at Ma'eriel Command headquarters, Wright Field, where the plane later was taken for further study.

10—The scene shifts back to North Africa where a squadron commander applies the lessons learned in the investigation and instructs his pilots in methods of attacking the ME-110 as a result of the findings.

AAF FIRST MOTION PICTURE UNIT
Culver City, California

WHAT THEY'RE READING

A COMPREHENSIVE manual, "The Air Force in Theatres of Operations—Organization and Functions," is being distributed to AAF organizations by the Chief of Management Control, under whose direction it was prepared.

The complete manual consists of 27 chapters, each dealing with some particular phase of Air Force organization or activity. These are combined into six separate booklets which, together, cover the organization, mission and operation of the Army Air Forces; the mission and organization of fighter, bomber, air support and air service commands; the duties and responsibilities of general and special staff sections, and the duties of squadron officers.

Chapter 27 (Booklet VI) of the manual is being reprinted separately, for squadron distribution. This chapter deals specifically with squadron mission and organization, squadron management and duties of squadron officers.

YOUR BODY IN FLIGHT. "Your Body in Flight," prepared by the aero-medical laboratory at Wright Field and published as Technical Order No. 00-25-13, tells in simple cartoons and accompanying text exactly what happens to the human body when flying in an airplane. Every physiological subject is covered, including high altitude, blackout bends, night vision, first aid in the air, and so on. The main purpose of the publication is to enable flyers to understand thoroughly the physiological problems they face on a mission.

OXYGEN EQUIPMENT. Revised Technical Order No. 03-50-1, "Use of Oxygen and Oxygen Equipment," contains comprehensive instructions and many new items which should prove valuable to high-altitude airmen.

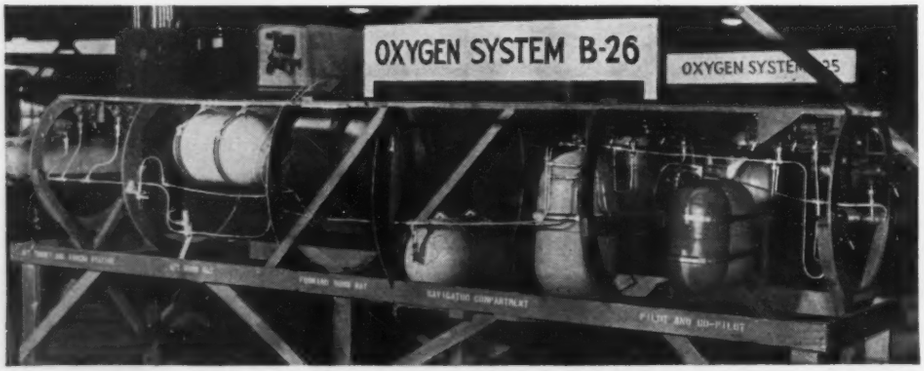
RECOGNITION. To aid in recognition of planes, ships and tanks, the Army and Navy are publishing a new monthly magazine, "U. S. Army-Navy Journal of Recognition." Widely distributed throughout the AAF, it supplements other recognition material.

In addition to publishing latest recognition developments, the magazine contains changes in equipment and methods, both our own and the enemy's.

NOTES ON AIR GUNNERY AND AIR FIGHTING. The Training Aids Division has reproduced a booklet entitled "Notes on Air Gunnery and Air Fighting" by Group Captain E. M. Donaldson, one of the RAF's most experienced fighter pilots. Because it summarizes the lessons which he and others have learned from actual combat, it should be helpful to pilots, pilot trainees and instructors.

INSTRUMENT FLIGHT. The important subjects of instrument flight and radio navigation are covered in a two-volume publication of the Navy's Bureau of Aeronautics, Training Division. Part I, dealing with Instrument Flight, is a straight Navy publication, enlivened with illustrations by the same artist whose work brightens the pages of the Navy "Sense" publication. Part Two, dealing with Radio Navigation for Pilots, is a special Navy edition of a book of Colin H. McIntosh, assistant superintendent of flying school operations, Military Division, American Airlines.

OXYGEN SYSTEM MOCKUP. A schematic model of an aircraft oxygen system (below) is now in use at Sheppard Field, Texas, for the training of maintenance crews in the proper servicing of oxygen cylinders, regulators, valves, lines and fittings. The device was designed and produced at Sheppard Field.



AIR POSTERS IN PORTFOLIO. There is a growing demand in the Army Air Forces for training posters, especially for poster series bound in portfolio form for classroom instruction.

The Training Aids Division has prepared a number of poster series bound in portfolio form. A lightweight binder serves as a container for shipping or carrying and as an easel for classroom use.

The poster illustrations and text matter cover the high points of courses of instruction for which they were designed. Drawings or photographs appear on the face of the sheet and on the back of the preceding sheet appropriate lecture notes are provided for the instructor.

The standard binder is made of die-cut cardboard, covered with olive drab slick paper stock. A handle is provided for the instructor's convenience. Like the poster sheets, the binder comes in two sizes:

Air poster portfolio.

30 by 40 inches and 22 by 32 inches.

The portfolio can be used anywhere—in the classroom, in the field, or under the shade of a tree or airplane wing.

In addition to the development of the poster series, AFTAD is canvassing all poster sources—military and commercial—to compile a catalog of training material which is available for distribution to AAF training activities.

Manufacturers of AAF equipment are cooperating with the training program by preparing and issuing air posters suitable for classroom use. Before the posters are issued, they are submitted to AFTAD for approval and for a determination of the requirements of AAF training stations. ☆

WHERE TO GO

Information on the availability of training films and film strips, aircraft recognition materials, synthetic training devices and training literature may be obtained from the Training Aids Division, Army Air Forces, Park Avenue and 32nd Street, New York, N. Y.

...BEEN HITTING THE BOTTLE?

No, worse luck, he hasn't! (Meaning the oxygen bottle, of course.)

If he had, he wouldn't be cutting up and behaving like a rummy at 15,000 feet. His is a beautiful case of anoxia (lack of oxygen) and it's playing hell with his sense of proportion—all because he is a wise guy and won't use his oxygen.

He has false feeling of exhilaration and self-confidence (one of the usual anoxia symptoms)..

He thinks he's OK. But that's how anoxia works. You begin losing efficiency at 10,000 feet; as you go higher your physical and mental functions become more impaired, and sooner or later you pass out completely.

So instead of getting ossified in the rarefied, be sure your oxygen equipment is functioning properly—and USE it above 10,000 feet. This will guarantee the clear head and steady hand necessary to shoot down the Nazi in the manner to which we would have him become accustomed.

(Fourth in a series by the Office of Flying Safety, formerly the Flight Control Command.)

Operation of Air Filters

By Wayne D. Cannon

WRIGHT AERONAUTICAL CORP.

EFFICIENT as they are, modern aircraft engines cannot digest sand.

The Germans found that out in Africa. So did the British and Americans. In fact, both sides discovered that it was possible for a new engine, ordinarily good for thousands of hours, to pick up so much sand on a single flight that piston ring wear would exhaust the oil supply and the plane would have to be abandoned behind enemy lines.

In this country, dust arising from training fields newly plowed out of the plains of the southwest has likewise emphasized the need for adequate air filter protection.

Air filters for aircraft engines were designed over twenty years ago, but the type of flying in the years of peace was such that engine wear from dust was not a particularly serious problem. Planes for the most part operated from airports with paved runways and sodded fields, while even on maneuvers the dust from temporary airfields did not affect a sufficiently large volume of planes to warrant installation changes.

In operations today, however, air filters are a necessity. Without adequate air filter protection, excessive engine wear makes it necessary to overhaul and rebuild engines at frequent intervals, increasing the use of maintenance workers and spare parts in areas where both are likely to be scarce. Even more important is the production problem, for an engine saved for further flight is the equivalent of an extra engine produced on an assembly line.

A great deal of research and experiment has been conducted on air filters in the last twenty years, particularly on air-conditioning equipment for offices, stores, theaters and factories. Filters also have been designed for farm equipment—a "must" out in the dust bowl regions—and for large stationary engines. Three general types are in use, although there are many others in existence, and one of these three has been found adaptable for use in aircraft engines.

One type is the oil bath filter, in which the intake air stream is directed against a tank of oil at the bottom of a U-shaped passage. The air stream bounces off the surface of the oil, while the dust and sand is retained. Although efficient, this type of filter cannot be used in aircraft, for the first bank or any other change of position from horizontal flight would cause the oil to spill over and slosh through the intake passage. In addition, this type of filter is extremely heavy for aircraft use.

A second variation is the dry-type filter, quite frequently used in air-conditioning systems, where size is not an acute problem and where air velocity is low. Felt, fabric or heavy layers of mesh or gauze are used as the filter media. These filter materials offer high resistance to the airflow and the resistance increases as dust is accumulated on the material. In addition, they are inflammable and require frequent replacement. They have a further disadvantage for aircraft use in that if they become damp, through storage in a damp place, or if they become wet during flight through a rain storm, the clay in the dust forms a mud pack over the filter, severely restricting the flow of air.

The third type of filter, the one now in most common use on American aircraft, utilizes a viscous impingement filter element. Briefly, these filters consist of knit wire or knit metal ribbon sheets suitably crimped and packed into durable metal frames. The mesh of the sheets is varied, becoming progressively smaller from the front, or intake, side of the filter to the rear side. The layers are supported in the frame with sufficient structural strength to withstand engine backfire pressure without damage.

Before use, the filter is dipped in engine lubricating oil and allowed to drain before it is installed in the induction system. The mesh of the dural sheets mechanically separates the particles of dust from the air stream and then the oil entraps and holds the particles. The filter element is installed in such a manner that it can be easily removed. Then it is cleaned in gasoline, dipped in oil and is ready for service again.

Viscous impingement filters, when properly made, are capable of removing a minimum of ninety percent of the sand from the air when the air velocity is 1,000 fpm without imposing a pressure drop of more than four inches of water. Filters having this performance can be built in a wide variety of shapes to fit the installation requirements, although flat surfaces are more easily manufactured. The thickness of the element is usually two inches.

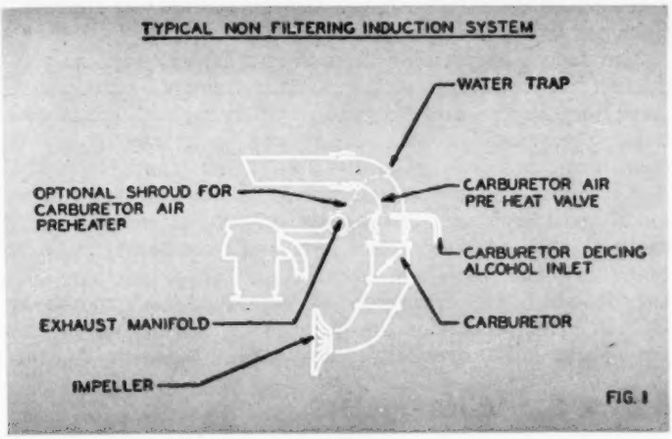
No attempt has been made to standardize the dimensions of a filter element because the configuration of airscoops varies with the design of the airplane, and therefore the shape of the filter has been left flexible so that installation designers will have as much leeway as possible.

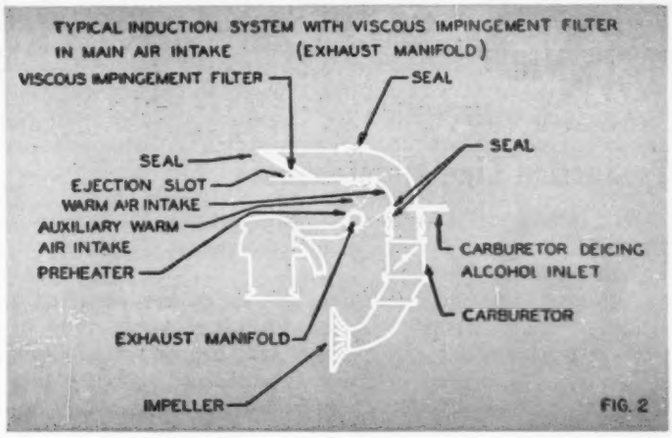
Even though the design treatment of an induction system varies widely from one airplane to another, certain parts are common to them all, as shown diagrammatically in Figure 1.

There are several ways in which the conventional induction system can be altered to accommodate a filter element. Figure 2 illustrates diagrammatically one way in which a conventional induction system can be changed to accommodate an air filter.

Note first that the filter is disposed so that it can be easily removed for cleaning. Ease of servicing is of great importance. It is usually necessary to position the filter at an angle to get an element of sufficient area into the scoop.

Just ahead of the filter element are ejection slots which bleed off some air which carries away the dirt and free water





that settles in the airscoop or is deflected by the filter element. These slots should be located with respect to pressures inside and outside the scoop so that the airflow will always be in the proper direction.

These slots replace the water trap shown on the previous system, since it is of utmost importance that the induction system be thoroughly sealed to prevent sand by-passing the filter, as would be the case if the water trap were not omitted.

In this connection, it can be pointed out that seals are shown around the filter element, at all joints, and at the alternate air intake.

The rest of the system is the same as a non-filtering installation with one exception. That is the treatment of the alternate air intake and carburetor air preheater.

In Figure 2 the solid lines represent the alternate air intake which takes warm air from the rear of the engine. The dotted lines indicate a shrouded exhaust manifold which picks up and preheats the carburetor air before it enters the induction system. This system may produce very high carburetor air temperatures if there is not an admixture of cold air through the main air intake. For this reason another valve can be added, which will be referred to as the auxiliary warm-air valve. This valve can be rigged to a single preheat control in the cockpit, so that for the first portion of the cockpit control travel the auxiliary warm-air valve remains fully open and does not start to close until the admission valve in the air-scoop is fully open. As the cockpit control is moved further toward the full-hot position, the auxiliary warm-air valve closes to give the pilot full use of the preheater.

This method of operating the preheat system adds no duties to the pilot and yet gives him an induction system suitable for flying in all kinds of weather.

This additional warm-air valve may appear to be an unnecessary refinement. It has been used on commercial airplanes for many years and is only new in its application to a filter installation. It is important, however, since it is conceivable that a ship with a filter installed in the airscoop may climb through a snow storm and have the filter completely blanked off and come out into sub-freezing temperatures that will not clear the filter. If, under these conditions, full power was required, the engine could best be served if the carburetor air temperatures could be held within reasonable limits. This auxiliary warm-air valve in the preheat system takes care of such an emergency.

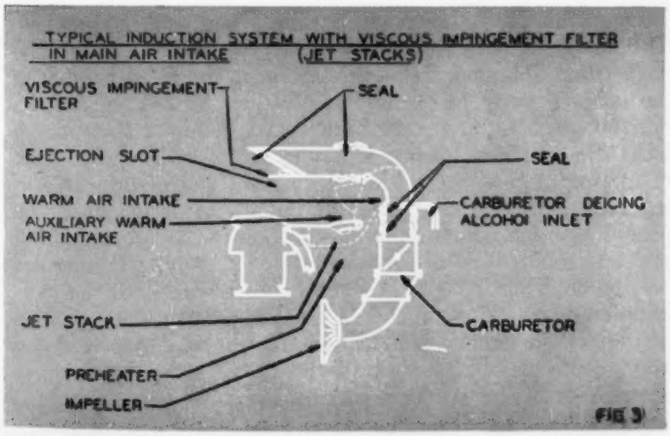
The entire alternate air intake system is used only in emergencies, and it has been found that sand is usually not present in damaging quantities in atmospheric conditions that require the use of the alternate air intake.

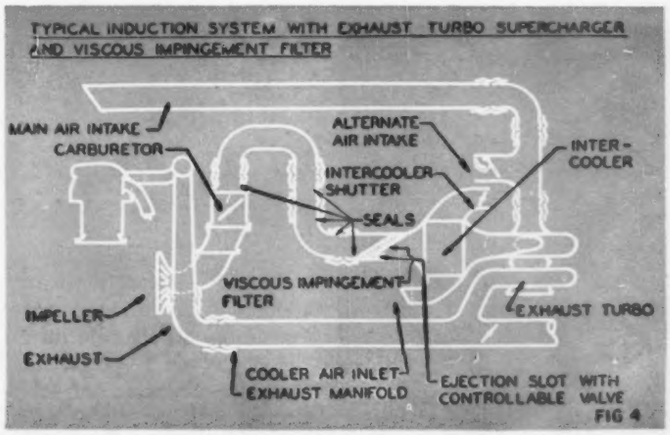
Figure 3 is similar to Figure 2, except that it illustrates a jet-stack installation in place of a manifold type of exhaust system.

Figure 4 illustrates one type of filter installation in an induction system employing a turbo supercharger. Note that the filter is located on the pressure side of the turbo compressor after the intercoolers. This location was selected as the point that will produce the least effect on the performance of the supercharger. The filter is located after the intercoolers for two reasons: first, so that heat control can be accomplished with the intercooler shutters and, secondly, so that the normal flow of air through the viscous impingement element will be at a reasonable temperature.

In a turbo installation there is some advantage at high altitude in being able to stop bleeding air out of the induction system on the pressure side of the turbo supercharger, and for this reason the diagram indicates controllable flaps at the ejection slots.

The diagrammatic installations shown are believed to give the engine the protection it needs against damage by sand, with the least complication and least added weight to the airplane, without upsetting the carburetor metering, and without imposing any responsibility or added duties on the pilot or flight engineer.





TECHNIQUE

(Continued)

Production Line Maintenance

One completely rebuilt aircraft engine every 45 minutes is the pace being set by ASC's model depot at Tinker Field, Oklahoma City.

Although not a manufacturer, this depot has perfected a system of production line maintenance that resembles those of pre-war automobile plants. Other ASC depots are adopting similar systems in their intensive drive to keep all our planes flying. Perfection of course is impossible but the OCAD, commanded by Brig. Gen. Arthur W. Vanaman, has reduced the number of grounded planes to less than ten percent of the thousands in its extensive service area and has the best record among ASC depots.

One of the chief reasons for this record is the rapid engine overhaul system being carried out under Col. Leslie G. Mulzer, veteran command pilot and chief of the engineering department.

The scarcity of trained mechanics was the original stumbling block in expediting the overhaul of intricate aircraft engines. The problem was solved by instituting training programs on specialized jobs in which individuals are instructed in one or two essential operations such as tightening bolts or inserting rods. After a trainee has acquired speed and skill, he is assigned to the assembly line where he performs continually this one specialized operation.

The assembly line system of overhauling and repairing aircraft equipment was not applied fully to air force installations until the shortage of skilled mechs made it impossible for crews to overhaul complete engines themselves. Now the engine shell moves through the line in eight hours.

Within this time the engine is removed from a plane and delivered to the engine repair section's dismantling department. Utilizing the scientific "magnaflux" X-ray process of analyzing wear, fatigue, breaks or irregularities in every piece of metal, each part of the engine is tested, inspected and if found in proper condition, forwarded to the "parts pool." Imperfect parts are either salvaged or reconditioned and returned to the pool, the depository for all engine parts except closely integrated units such as gear trains and fitted units which are tagged together.

Because tolerances are so close and inspections so thorough, every part is interchangeable. When an engine is rebuilt it may contain parts from as many as thirty different engines yet operate as efficiently as a new one.

Along the re-assembly line are work benches with small stocks of parts for each station's operation. Above each bench is a red light that is flashed on when the supply of parts at that station is running low. A stock tracer immediately checks the station number and draws from the parts pool to replenish the supply at that bench, keeping the line flowing.

Engines are torn down, get steam bath before "Magnaflux" testing.

When completely reassembled, the engine is put through a test run under simulated temperature extremes. If found satisfactory, it is then released for installation.

New tools and new methods are constantly being adopted to expedite the process and assure uniformity. These include a special nut tightener operated on the electric drill principle, with special adjustments equalizing the tension so all nuts are tightened to the same pressure.

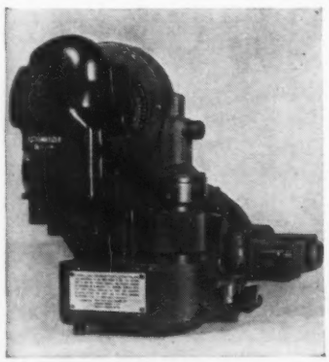
The depot's engineering division also has extended its production line methods to such items as instruments, spark plugs, generators, starters and magnetos, and through its specialized training program has been able to step up its rate of instrument repair and overhaul to about 8,000 per month.

Additional evidence of the success of the system are these monthly output figures: spark plugs, 80,000; magnetos, 1,300; starters, 450, and generators, 300—all completely rebuilt. Many of these units are installed in the more than 100 aircraft which are completely reconditioned each month at OCAD. The remainder are shipped to sub-depots in the service area and to overseas centers. **— Capt. Robert V. Guelich.**

A New Aid to Navigators

An averaging sextant has been designed to increase accuracy and relieve the navigator of the excessive mental and physical fatigue connected with computing averages arithmetically or with using earlier and simpler types of averagers.

The new instrument is an ordinary AAF type sextant with an automatic averaging device attached. This device is merely a chronometric or clock type instrument which is simple in operation and requires very little effort from the navigator using it. Conservation of effort is very important to navigators working long flights at high altitudes in more or less uncomfortable surroundings and distractions. Navigators find that they are prone to make many mistakes in the simplest kinds of computations when working under such unfavorable conditions. Only navigators who have had to rely on the older methods of averaging their celestial shots can appreciate the advantages of the chronometric integrator or averager.



New averaging sextant.

It is quite well established that accuracy of celestial observation is greatly increased by this type of device which automatically averages some 100 shots in two minutes of observation, thereby virtually eliminating chance error due to small speed changes, vibration and rough air. The shots are taken at a uniform rate of one every two seconds. Principal factors contributing to better accuracy in celestial observations are:

1. Decrease of fatigue and human error.
2. Ability to average a greater number of shots in one observation.
3. Assurance of uniform spacing of shots.
4. Freedom of the navigator to concentrate on keeping collimation between the bubble horizon and the body being observed.

Operation of the averager is simple and straight-forward. The navigator winds the clock apparatus prior to taking the observation. He then sights the sextant in the usual manner at the celestial body to be observed. When he has the bubble horizon and body in or near coincidence, he flips a lever which locks the averaging device at a zero or reference point. The instrument is now set up for making the observation. When the navigator gets the star and bubble in coincidence, he presses a button which starts the chronometic device averaging plus and minus from the zero or reference point. He now has only to hold the star and bubble in coincidence until the two-minute period is completed at which time a dark shutter obliterates the field of view. The navigator may then read the average altitude of observation direct on a Veeder-type counter on the side of the averager. **— Prepared by the Materiel Command Equipment Laboratory, Wright Field.**

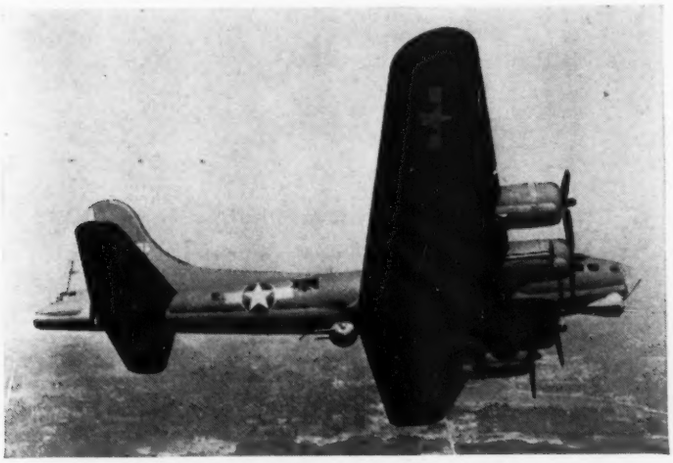
Introducing the B-17G

The B-17G, incorporating a number of new features, is now in production.

The most noticeable change in the Fortress' external appearance is the addition of a chin turret. A twin .50 caliber unit, the turret is located directly under the bombardier's compartment. It is electric-powered and the two M-2 machine guns are equipped with recoil absorbing mechanism, firing solenoids and hydraulic gun chargers. The guns have an effective range of about 1,000 yards.

A controller, which when stowed rests against the right side of the fuselage, regulates the chin turret movement. It is unlatched and swung to a convenient height before operation.

The sight, synchronized with the movements of the gun in azimuth and elevation, is driven by tachometer shafts from the azimuth and elevation gear trains. Thus the gunner's vision always takes in the direction in which the guns are pointing and moves with them. A rheostat controls the intensity of the light focused on the concentric circles projected on the sight glass. These circles and their center are employed like the ring sight and dot on a flexible gun installation. The gunner must estimate all incurred corrections after observing the projectory of tracer bullets. In order to permit flow to the guns while



The Fort now has a chin that stings.

the turret is in motion, ammunition is held in two metal containers fixed to the movable turret housing.

Another minor change in external appearance of the bomber is effected by the removal of the two B-17F pitot-static masts on each side of the nose and the installation of a single pitot mast just below the body centerline. Flush-mounted static fittings are placed on each side of the body just above the front edge of the forward entrance door. The radio compass loop has also been moved to a point just ahead of the bomb bay doors and slightly to the left of the body centerline.

The navigator's compartment has been worked over and a larger table and a swivel chain installed. The gyro flux gate compass and radio compass have been rearranged and a shelf provided over the table. A step is added beneath the astrodome to facilitate taking sights. Interphones, jack boxes and heated suit rheostats have been relocated.

An entirely new cable-operated bomb control system is a feature of the B-17G, eliminating the push-pull rod control and embodying a new bomb control handle assembly and a gear type coordinating unit. The three outstanding improvements and advantages gained are: (1) The bomb doors can be closed from the bombardier's station after the emergency release is pulled. (2) In addition to the mechanical interlock, the bomb door actuating switch handle is located so as to interfere with any attempt to move the internal bomb control handle to select without first opening the bomb doors. (3) The release of the external bombs can take place without affecting the internal racks or the bomb doors.

Handy Flight Control Desk

Capt. Herbert Bernenko, base operations officer at Kellogg Field, Mich., has designed a functional desk in an effort to eliminate the usual disorder that comes from keeping flight control equipment on an ordinary table and to give the clerk privacy needed for his work. The desk was built by woodworkers at the base sub-depot.

It is semi-circular with a curved board rising from the outer edge to screen the clerk. The interphones are suspended from either end of the board and within easy reach. Maps and rules of procedure are affixed to the inside. Telephone, interphone speakers and teletalk equipment are aligned along the rim of the desk, with plenty of space left for log sheet and scratch pad.

Everything within reach.

Open compartments, built in directly under the desk top, and drawers and cupboards on the right and left provide handy space for storing equipment and forms. All wires run under the floor to the desk, giving the clerk free access to the status boards. — **Public Relations Office, Kellogg Field.**

Self-Powered Airplane Starter

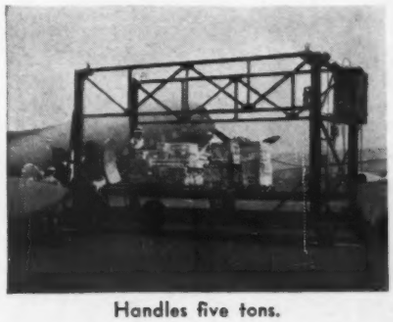
A portable self-powered generator unit built from obsolete spare parts, scrap iron and other salvage materials now is used to start most of the planes at Chanute Field, Ill., replacing the usual battery cart. The unit was designed and constructed by Tech. Sgt. Robert Mercer from an idea suggested by Maj. Howell G. Crank, post operations officer.

Power for the generator is supplied by a 2-cylinder, 13½-horsepower gas engine, originally designed for use as an auxiliary to generate electric current in obsolete planes. The entire unit is mounted on three wheels for easy movement. Connection to the plane is made by a thirty-foot insulated cable. Two two-gallon tanks supply engine fuel. Control panel instruments and controls include a fuel pressure and oil pressure gauge, ammeter, voltmeter, throttle, generator, and starting and ignition switches.

Generating 24 volts, the unit can be used on most types of military aircraft. — **Public Relations Office, Chanute Field.**

Mobile Elevator for Loading Planes

A mobile elevator by which planes are loaded from a roller-conveyor is facilitating the handling of air cargo by the 39th Air Freight Wing Detachment at the Newark (N. J.) Army Air Base. It was developed by Capt. Julian A. Devereaux, CO of the detachment, Phillip A. Cosgriff, general superintendent, and the Mercer Engineering Co., New York City.



Handles five tons.

In use since midsummer, the elevator is adjustable to heights from 12 to 22 feet, sufficient to accommodate the largest plane. It has a platform 8 by 22 feet, a 10,000-pound capacity, and is powered by a five-horsepower electric motor.

Also useful in loading and unloading operations at the air freight warehouses, the elevator is moved by regular small tow-tractors. — **Capt. Arthur J. Lonergan, PRO.** ☆

OVERSEAS MOVEMENT

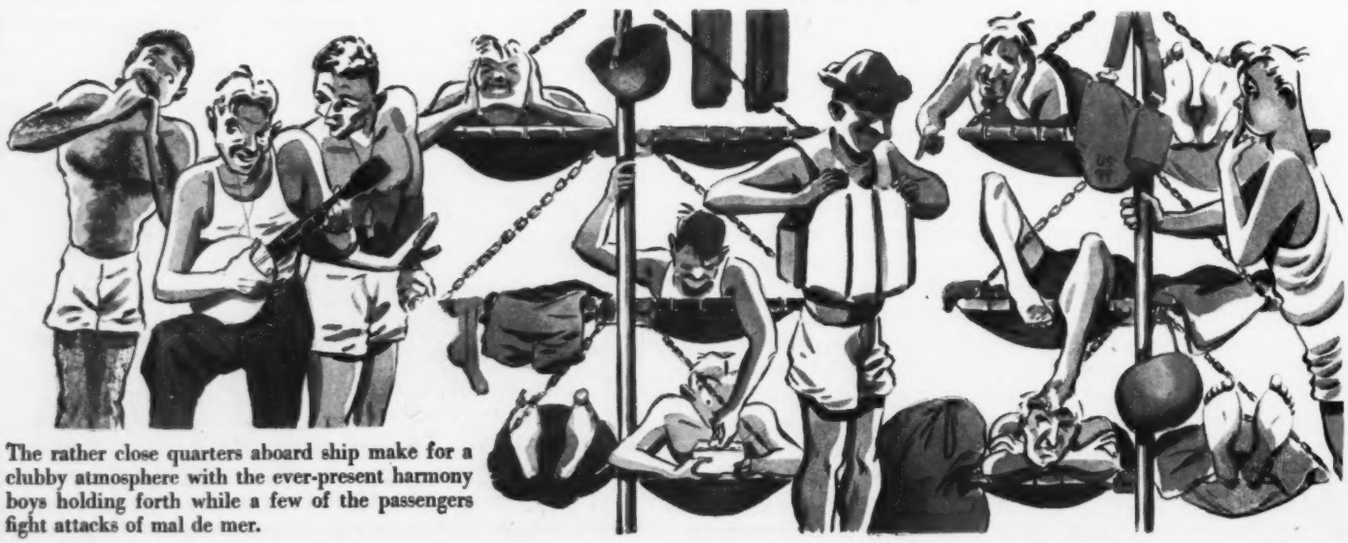
By Lieut. Wm. F. Lent

First Sergeant Cathey's squadron has been alerted, and like a mother hen protecting her brood from the approaching storm, the good sergeant is checking with the unit personnel office and the supply sergeant to bring up to date each man's service record, clothing record and forms 20, 81 and so forth.

In today's Army a man is always being shot or shot at. Immunization records must be completed before the unit departs for the staging area. In this case, Tail Gunner Simpson is more afraid of the medic's stiletto than he will be of the heavy flak over Berlin next month.

Corporal Newman is luxuriating to the fullest extent on his pre-overseas shipment furlough. He'll carry Sis' snapshot of this boudoir scene with him over there to buoy his spirits while sweating out a long chow line near a muddy field kitchen.

The movement from the staging area to the port of embarkation is generally accomplished with unbelievable smoothness and accurate timing. Private Willoughby proves the exception to the rule when the knot on his "A" bag slips as he walks up the gangplank.



The rather close quarters aboard ship make for a clubby atmosphere with the ever-present harmony boys holding forth while a few of the passengers fight attacks of mal de mer.

Wings for the Wounded

(Continued from Page 23)

Jenny—had been arranged to accommodate a special type of litter with patient.

Many improvements of plane No. 3131 were effected by enterprising flight surgeons and cooperating Air Corps officers during 1918 and 1919. During the years following the war, flight surgeons repeatedly urged the use of airplane ambulances by the armed services. Various planes were converted to carry one or two litter-type patients. Transportation of patients from airfields to general hospitals was encouraged throughout the Air Corps during this period, but, like many other developments within the armed services, there was much opposition to air evacuation as such.

At this time, the French again led in the development of the first airplane ambulance organization. A Major Epaulard in October, 1921, organized the first airplane ambulance squadron, consisting of six planes adapted to carry two or three litter patients. This unit saw duty during the French military operations of 1921 and 1922 in Morocco and the Levant. During the last six months of 1921, approximately 700 patients were evacuated by air. For comparison of figures only, it might be mentioned that during the month of August, 1943, a total of 927 patients were provided air evacuation along the ATC global routes. U. S. Marines in Nicaragua during the twenties found that air evacuation was not only the medical answer to the evacuation of wounded but also the best defense against ambush methods of the insurrectionists.

TODAY the organized air evacuation service of the Army Air Forces depends on cargo and transport planes—the C-46, C-47, C-54, C-75 and C-87—the same planes that carry equipment, medical supplies, gasoline, oil, food, jeeps, field artillery pieces, parachute troops and airborne troops to the forward areas. On their return from the fighting zones—whether within the theatres of operations or between the theatres and the States—these planes fly casualties to hospitals hundreds of miles from the din of the battle areas. A small number of O-49 planes, called the L-1A, have been converted to carry two litter patients for use at isolated stations. In certain island commands AAF task forces use PBY amphibian planes, but this is the exception rather than the rule.

The future of air evacuation, both for military and civilian requirements, is limited only by the type of equipment available. The helicopter and the pick-up glider are in the development stage. However, staff members of the Aero-Medical Laboratory at Wright Field, as well as many other flight surgeons in the medical service of the Air Forces, are continuing research to effect constant improvements in air evacuation. Development of the present type of medical supplies, oxygen equipment and litter supports, now used throughout the air evacuation service, is the result of the combined efforts of the Aero-Medical Research Laboratory, the Troop Carrier Command, the AAF School of Air Evacuation and the School of Aviation Medicine.

The skill of American surgeons, the miracle of the new sulfa drugs and blood plasma are given a far better opportunity to effect their life-saving potentialities when the casualties are transported by air in the most comfortable and rapid means possible. The low fatality rates of this war bespeak in themselves what these combined efforts of the medical service have accomplished.

As to the morale value of air evacuation, the true answer can only be found in the patients who have endured the hardships of surface ambulances or hospital trains in the fighting zones, and have later been placed aboard an airplane to continue their trip to a hospital in the rear area. These patients are indeed the most enthusiastic advocates of air evacuation. ☆

What's Your AIR FORCE I.Q.?

Take a look at the ceiling, then take off on this month's AIR FORCE Quiz. Chalk up five points for each correct answer. A score of 90 or above is (as usual) excellent; 80 to 90, on the runway; 70 to 80, not bad; 60, fair; below 60, well. . . . Answers on Page 56.

1. Corsica is located
a. Between Sardinia and Sicily
b. In the Adriatic
c. Off the west coast of Turkey
d. North of Sardinia

2. The wingspread of the P-51 is approximately
a. 43 feet *c. 37 feet*
b. 31 feet *d. 28 feet*

3. If a pelorus is an instrument used by a navigator, Polaris is
a. The North Star
b. An instrument used by a bombardier
c. An island in the Solomon group
d. The distance from the North pole to the South pole

4. Headquarters, 6th Air Force is located in
a. Hawaii *c. Greenland*
b. Alaska *d. Panama*

5. "George" is the name sometimes given
a. The P-51
b. The last plane in a bomber formation
c. The automatic pilot
d. A ground fog

6. Army paratroops are
a. Members of a service branch of the AAF
b. Members of the Caterpillar Club
c. In the Ground and Service forces
d. Members of the Troop Carrier Command

7. If WAC is the abbreviation for Women's Army Corps, for what does the abbreviation WAVES stand?

8. Ellington Field is located in
a. Mississippi *c. Texas*
b. Florida *d. Illinois*

9. AAF planes have dropped bombs in combat with delayed-action fuzes set for as high as one hour.
a. True *b. False*

10. Don't look now. What are the colors in the AAF shoulder patch?

11. The grade in the Navy equivalent to the Army staff sergeant is
a. 2nd Class Petty Officer
b. Seaman First Class
c. 3rd Class Petty Officer
d. Seaman Second Class

12. The horsepower developed by each engine of the B-17 is
a. 900 *c. 1,200*
b. 1,500 *d. 2,000*

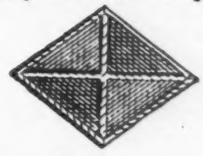
13. The official song of the Army Air Corps was written by
a. Irving Berlin
b. Robert Crawford
c. Maj. Gen. James Doolittle
d. George M. Cohan

14. A chaplain with the rank of major can properly be addressed as either Major Jones or Chaplain Jones.
a. True *b. False*

15. Bomber crews with the 8th Air Force usually are grounded after
a. 20 missions *c. 25 missions*
b. 30 missions *d. 35 missions*

16. "Towing the sleeve" refers to
a. Pulling a target for aerial gunnery
b. Coming out of the barracks half dressed
c. Flying back with one engine gone
d. A transport plane with a glider attached

17. Identify this collar insignia:



18. The sump is
a. Part of an engine crankcase serving as a reservoir for lubricating oil
b. Excess pressure at the bottom of a gas cell over the outside atmospheric pressure
c. A positive-displacement reciprocating pump
d. A Southerner's way of saying the sun has risen

19. Latitude indicates distance from the equator
a. North or south *c. North or east*
b. East or west *d. South or east*

20. Only one of the planes listed below has twin engines and twin tails:
a. Beaufighter *c. Hurricane*
b. ME-110 *d. ME-109*

Illustrated by Lieut. William T. Lent

THE Germans recently have increased their use of smoke screens as a measure of protection against the increasing fury of Allied air raids. Occasionally an entire area is blanketed with smoke, and at other times a ground haze is created to distort objects seen through it and thus become as effective as the full screen.

The screen is not actually smoke but a suspension in air of tiny, liquid particles sprayed by generators built on somewhat the same principle as a Flit gun. Weather, of course, affects the density of the screen. The best sort of a day for the Germans—and a bad one for us—is a highly humid day with little or no wind.

The Germans have increased the volume of the smoke by increasing the number of generators in a single locality. A year ago only ten or twelve generators would be operated in one place; now as many as 350 are used. The Germans are using barges as bases from which to operate the generators used in protecting ports. Perhaps the Nazis are at least making some use of the barges with which they intended to invade Britain.

An unusual characteristic is that the screen tends to thin out as the target is struck by successive waves of bombers. Best explanation is that the percussions of the bomb explosions aid the natural dispersion of the screen.

APPRAISAL OF THE JAP. An S-2 officer from the South Pacific appraises the Jap in these words:

"The Jap racial characteristic of cunning is one that should be considered in definite distinction to intellectual strategy or thoughtful tactical deception. It is an innate quality, almost instinctive, a quality to be remembered because, like the small animals of the forest who can outwit their larger adversaries, the Jap is capable of inflicting damage and confusion upon him whose alertness lags, on him whom complacency has so far disarmed. However, in all contacts with him, by no means the superman of early nightmares, we shall continue to find that we have a persistent, industrious, audacious and diligent enemy; often unimaginative, but conditioned to hardships and scornful of suffering; an enemy whose conceivable advantage and definite 'capability' is his mental attitude and complete resignation to war. A fighter whose conception that his own civilization is spiritual, while contemptuously charging his opponents with materialism, carries into the fray a crusader spirit that is an enviable weapon in anyone's hands."

FAKE CITIES. The Germans repeatedly have built fake cities to lure our pilots away from Berlin. A forest outside Berlin was cut through with lanes so at night it might look like the Tiergarten Park. Then fake roofs of cloth and paper were placed in the area, and at night low lights were illuminated to make the location appear as a blacked-out city.

In their efforts to camouflage landmarks in another city, the Nazis drained a small lake near the harbor and built imitation houses on the lake bed. A wooden bridge was constructed to look like a noted bridge which, in turn, was disguised to resemble a boulevard complete to a replica of the town's most famous cafe.

It is reported that a large railway station, complete in every detail, was erected in a large field at another location. Very realistic, it even included dim, colored lights which at night looked like signal boxes. After raids, fires were lit to deceive airmen even further.

The Rumanians built a fake town near the Ploesti oil fields, equipping it to appear moderately lighted at night. It was the same size as the town of Ploesti and four miles away—in the opposite direction from the oil fields, of course.

RADIO PHONY. The pilot of a P-400 (Australian P-39) was on patrol when a message advised his flight of a change in the vector of the mission. The flight altered its course. But a smart controller at home

base had also heard the message which had been slipped in on the correct frequency by the Japs. He then checked the flight back to correct the trap the Japs had set. Now all controllers and flight or squadron leaders maintain frequent contact to prevent the Japs from vectoring our planes off course.

Pep Talk. An order of the day which Reichsmarshal Goering issued to German Air Force units in the Mediterranean area was captured recently. "Together with the fighter pilots in France, Norway and Russia, I can only regard you with contempt," Goering told his men. "I want an immediate improvement and expect that all pilots will show an improvement in fighting spirit. If this improvement is not forthcoming, flying personnel from the Kommodore downwards must expect to be reduced to the ranks and transferred to the Eastern Front to serve on the ground."

German Recognition Signals. The Nazis have used cloth strips, flags, felled trees and smoke candles as ground force recognition signals to their aircraft. Now and then, when lines were changing rapidly, the ground troops have been disciplined for forgetting to remove the cloth strips used to indicate a bomb line. These mistakes have been less frequent recently, inasmuch as company commanders are now held personally responsible for the cloth.

For a while, the Nazis used swastika flags to indicate their units, but they proved difficult to recognize from the air Smoke candles are gaining more widespread use. In some instances groups of men, in danger of being attacked by one of their own planes, have been known to form a swastika on the ground and wave their handkerchiefs. At night these groups wave flashlights or torches.

Enemy airplanes have been known to signal ground troops with Very pistols, flares, rockets and smoke shells. The smoke shells have been used frequently to indicate Allied positions, tanks, artillery batteries or movements. German pilots, spotting an artillery battery have dropped blue smoke bombs over it so that their ground troops could observe its general location.

The Germans also have used an interesting flare system in some of their night bombing flights. A "pathfinder" would go ahead of the attacking planes to spot the target and drop a colored flare when he thought he had found the right place. Then another plane would drop illuminating flares, and the pathfinder would circle to make certain he was right. He would then signal the bombing planes to come in and unload.

Draw a Good Bead. A top turret gunner, with a record of 45 missions over Europe and Africa, makes this observation about German fighter tactics: "The Germans these days are not concerned with precision shooting against any one particular bomber. This lesson was learned the hard way. At first the Nazi came in fast and straight, and usually level at the tail. Their gunnery was deadly, but the Allied tail gunners were too good for that approach. The Nazi tactics changed rapidly, and our gunners were faced with the difficult target of speeding, rolling ME-109s. They'd come in from the back, with all guns of the six or more Messerschmitts shooting at the group of bombers.

"What can we do about that? Nothing except shoot straighter, faster and more accurately."

Left, Right, Left. At one time a favorite Nazi tactic in trying to break up formations of P-38s escorting bombers was to bring six or seven FW-190s directly over the P-38 formation from the rear and then split, four or more turning left and the remainder right. The fighters going left would attack the P-38 formation, and when the P-38s broke left, the enemy fighters on the right would move in on the exposed bomber flight. The P-38 commander retaliated by calling up his reserve flight, telling its pilots to break right, while the other flights went after the enemy on the left.

Tin Cans and Valises. Food tins have been left around by the retreating enemy for some Allied soldier to pick up or kick. Many of these tins are packed with explosives to kill everyone within a range of several feet. The Germans also "plant" carrying cases as mines, leaving them where curious troops are likely to pick them up for casual inspection or as souvenirs. They are usually charged with TNT and filled with nails, bolts, nuts and odd pieces of iron.

Under the Spreading Coconut. A striking example of Japanese sleight-of-hand and audacity has been reported by an S-2 officer with a heavy bombardment group in the Solomons. "In November, 1942, the Japs built a new landing field right under our very noses," he said. "This field on Munda Point gave the Japs very great potentialities and their presence was barely discernible at first.

"Always crafty in the use of camouflage, the Japs took full advantage of the webbing of coconut palms that lay like a giant net over much of their activity. The absence of day workers, trucking and other signs of construction was later explained by night reconnaissance which revealed the field literally crawling with workers — everything proceeding with startling animation under artificial illumination."

Shakespearean Stuff. Theatrical producers in Shakespeare's time used to save on the budget by marching some men across the stage, behind the backdrop, and across the stage again, giving the effect of a huge army. The Germans tried to work the same trick one recent night by moving trucks and tank units back and forth just behind the lines, trying to make things look as if they were getting reinforcements. When they retreated the next day, they left behind numerous dummy trucks made of cardboard.

The Next Outfit. During the Tunisian campaign, an anti-aircraft unit dug into a position on a hill. That night at dusk, some engineers in British and French uniforms came into the vicinity and started digging gun pits to the rear of the AA guns, while the AA crew watched with some interest. The next morning, the engineering units with their guns placed turned them on the AA unit and drove it out, taking over the abandoned equipment. The "French" and "British" were Germans. Moral: NEVER TRUST ANYONE YOU DO NOT KNOW—ALL UNKNOWN PERSONS, WHATEVER THEIR UNIFORMS, ARE TO BE SUSPECTED. ☆

LIGHTNINGS IN THE SKY

Written by a Radio Operator-Gunner on a B-17 in the African Theatre

Oh, Hedy Lamarr is a beautiful gal
And Madeline Carroll is, too;
But you'll find, if you query, a different theory
Amongst any bomber crew.
For the loveliest thing of which one could sing
(This side of the Heavenly Gates)
Is no blonde or brunette of the Hollywood set,
But an escort of P-38s.

Yes, in days that have passed, when the tables were massed
With glasses of Scotch or champagne,
It's quite true that the sight was a thing to delight
Us, intent upon feeling no pain.
But, no longer the same, nowadays in this game,
When we head north from Messina Straits,
Take the sparkling wine—every time just make mine
An escort of P-38s.

Byron, Shelley and Keats ran a dozen dead heats
Describing the view from the hills,
Of the valleys in May when the winds gently sway,
An army of bright daffodils.
Take the daffodils, Byron; the wild flowers, Shelley;
Yours is the myrtle, friend Keats.
Just reserve me those cuties, American Beauties,
An escort of P-38s.

Sure, we're braver than hell; on the ground, all is swell—
In the air it's a different story.
We sweat out our track through the fighters and flak;
We're willing to split up the glory.
Well, they wouldn't reject us, so Heaven protect us,
And, until all this shooting abates,
Give us courage to fight 'em—and one other small item—
An escort of P-38s.

OUR DEVELOPMENTS IN FIREPOWER

(Continued from page 18)

to design, perfect and install these turrets in mock-ups long before the big plane took to the sky. Thus, contrary to popular belief, American designers were studying the effectiveness of mechanically controlled turrets some time before the war.

Types of armament are determined by the tactical use to be made of the airplane. For instance, in the case of a night fighter where the normal technique requires approach on the target from a certain direction, the fire control equipment must be so designed that the maximum firepower can be obtained in that direction. The sight operator's position must be located to permit maximum visibility in scanning and sighting. In the case of the night fighter, development of a sight that allows greater passage of light through the optical system may be required.

One night fighter developmental design has a multiple-gun turret. For several months in our laboratory we tested the turrets in special mock-ups before the completed airplane was brought to Wright Field. The plane's upper turret fairly bristles with guns, resembling an infantry pill box.

In the past, the main function of the armament laboratory was to develop new aircraft armament items. In addition to this development work, much of the effort of this laboratory — and of the Engineering Division—is directed toward the modification of combat equipment to replace one type of standard equipment with another type, depending on the tactical use of the aircraft. Other developments engineered by the armament laboratory may not be for specific application, but for insurance against the day they are needed. Some of our newest gadgets are put on the shelf to await the time when they can be used most effectively.

Up to the present time, armament for fighter aircraft has varied only in caliber of guns. However, with the stepped-up tempo of enemy fighter activity, the requirement for a fixed gun installation that will provide automatic corrections for lead, range, altitudes and speeds is becoming more apparent. This subject now is being investigated and development articles are being tested to ascertain their suitability. A great amount of development work also is being accomplished on new improved types of fighter gunsights. These include sights for night fighting purposes, extension of present sighting ranges, combination gunsights and dive bombsights.

That the firepower job is being well done is evidenced by the tallies which our airmen are scoring in combat against the enemy, by the number of Jap and German planes falling in combat, and the ever-increasing pounding of enemy cities by our big bombing planes.

Literally, we are designing guns and putting wings on them. ☆

MISTAKES IN 'ON THE LINE' PICTURE ON PAGE 40

(READING FROM LEFT TO RIGHT)

1. Get your foot off the crank handle, Corporal! It's no foot rest. The engine is apt to turn over if inertia is engaged. Incidentally, that crank shouldn't be there. Also, move your left foot off the coolant hose. Reference: Common sense and TO 04-5-12.

2. It's feet first in this picture, but they're in the wrong place. You there, removing the electrical connection on the magneto. Don't stand on the cowl former because your weight will break the part, the cowling won't fit and the former will have to be replaced. Reference: Good shop practice.

3. That screwdriver stuck in the manifold foreshadows a great hazard. If it falls down between the "V" of the engine, and stays there, you can't tell what might happen.

4. Ouch! Dual boner from you seated on the maintenance stand. First, take your foot off that piece of cowling. You'll mash it so it won't fit. Secondly, nix on using that long extension handle to install spark plugs. It will cause pulled or stripped spark plug bushings. Use the proper torque wrench and refer to TO 03-5E-1.

5. Now, Corporal, you know better than to take the prestone coolant cap off with a screwdriver and hammer! A strap wrench is used. Reference: TO 01-75FB-2. And your left foot—keep it off the prop shaft or you'll damage the splines. Reference: Good old horse sense.

6. And say, come to think of it, are you the famous man from the flying trapeze? We're wondering just how you landed there anyway, which gets us around to the boner of the crew chief stand not being under the prop shaft.

Answers to Quiz on Page 53

1. (d) North of Sardinia.
2. (c) Approximately 37 feet.
3. (a) The North Star.
4. (d) Panama.
5. (c) The automatic pilot.
6. (c) Ground and Service forces.
7. Women Appointed for Volunteer Emergency Service.
8. (c) Texas.
9. (a) True. For example, in the August attack on the Ploesti oil refineries.
10. Gold, Blue, Red and White.
11. (a) 2nd Class Petty Officer.
12. (c) 1,200.
13. (b) Robert Crawford.
14. (a) True.
15. (c) 25 missions.
16. (a) Pulling a target for aerial gunnery.
17. Finance Department.
18. (a) Part of an engine crankcase serving as a reservoir for lubricating oil.
19. (a) North or south.
20. (b) ME-110.

Printed in U. S. A.

Pass this copy on!